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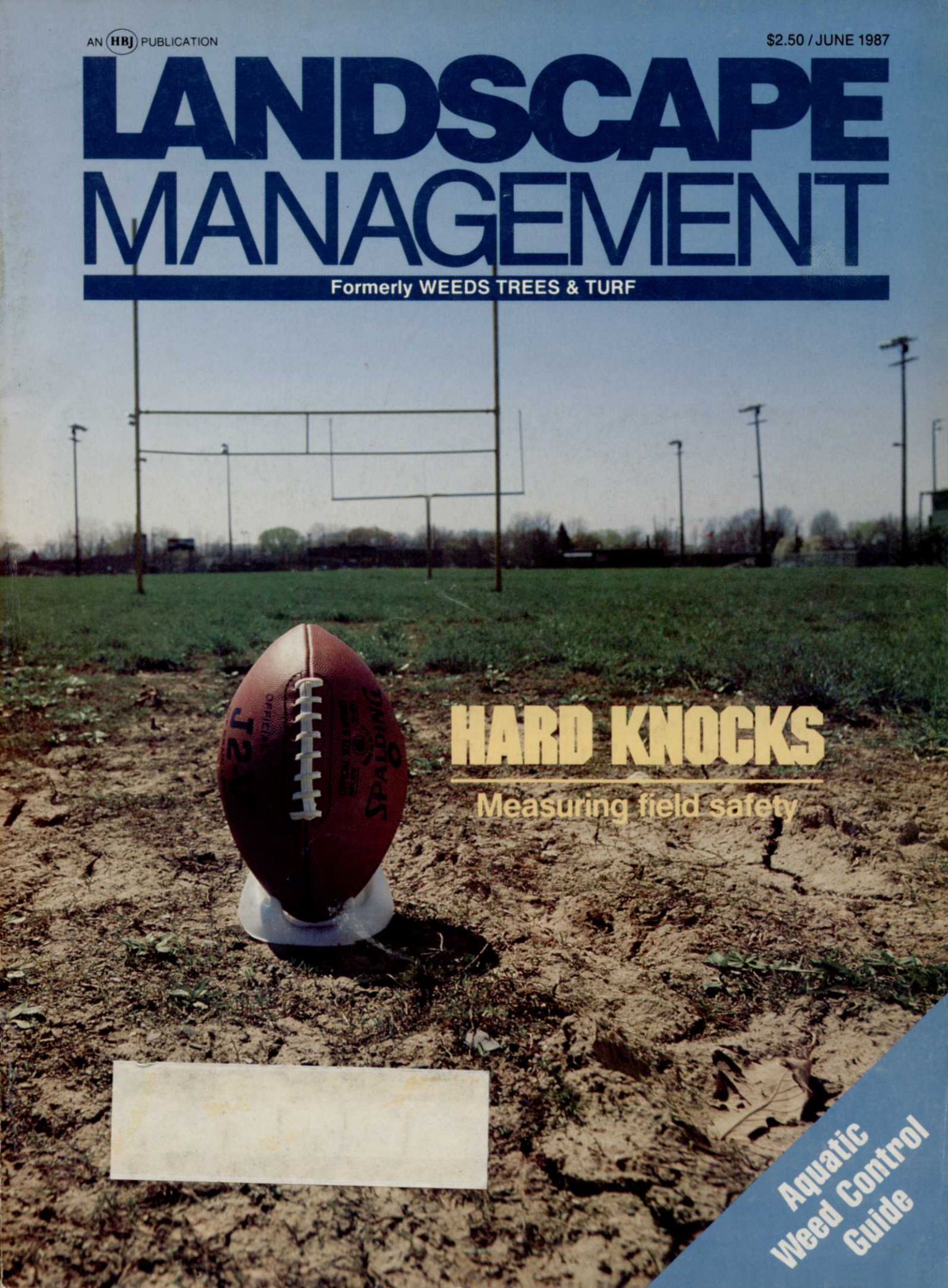

HARD KNOCKS

Measuring field safety

Aquatic Weed Control Guide

Penneagle crowds out bluegrasses on Butler National's fairways

Triplex fairway mowing at The Butler National Golf Club, Oak Brook, IL

When Oscar Miles, CGCS, of The Butler National Golf Club, introduced Penneagle creeping bentgrass into his Poa annua infested A-20 bluegrass fairways in 1980, he took a dynamic step toward the beautiful fairways praised by the pros during the Western Open.

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JUNE 1987, VOLUME 26, NUMBER 6

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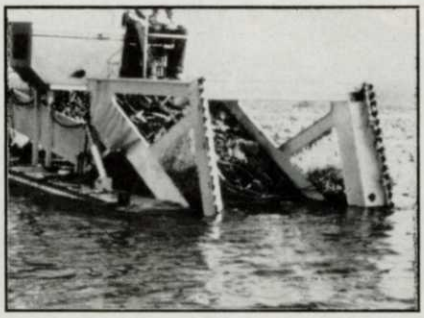

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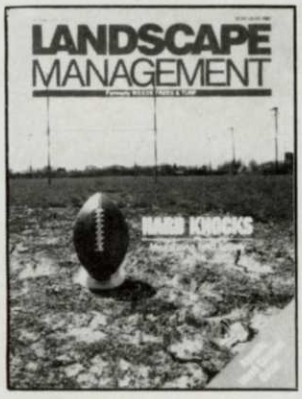

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JOHN DEERE

It's easy to spot reel quality

Tear off a corner of this page. Now, use a scissors to cut off the other corner. Notice a difference? It's the same difference you'll spot when comparing turf cut by reel versus rotary mowers.

Reel mowers cut grass like a scissors cuts paper. Cleanly. There's less bruising of the grass plant so your turf looks better.

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The 303 and 305 are 3- and 5-gang pull-behind units. Both feature 30-inch floating cutting heads that mow down to ⅜-inch and are available in 4-, 6-, 8-, and 10-blade versions.

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PGR market belies product name

■ Growth in the Plant Growth Regulator (PGR) market recently has been anything but regulated, or slow.

PGRs work by inhibiting seed head development on plants while still encouraging leaf development and growth, a scenario that often keeps turf green well into the hot summer months.

Products such as PBI/Gordon's Embark and Monsanto's Limit have been helping to reduce mowing frequency and cost in many areas of the green industry, especially rights-of-way. "Application of Embark," says PBI/Gordon product manager Earl Tracy, "prevents the need to mow for six to eight weeks."

And with costs in every area of turf care continuing to rise, a money saver is almost certain to become popular.

Survey says landscaping growth will continue

■ The 12th annual economic survey by the National Landscaping Association indicates that a majority of repondents believe the landscaping industry will continue to grow, most notably in residential landscaping.

For 1986, 70 percent of respondents reported increased sales in residential landscaping; residential renovation was up 61 percent; 65 percent reported increases in new commercial landscaping; just 33 percent reported increases in commercial renovation (53 percent showed no change).

When asked to forecast for 1987, 60 percent anticipated increases in new residential, 45 percent in new commercial.

On the whole, respondents' business increased an average of 21.7 percent from 1985 to 1986, well above the 16.8 percent forecasted at the beginning of 1986. Respondents are predicting an increase of 16.5 percent from 1986 to 1987.

California a model for other state regulators?

■ It seems that California's enactment of Proposition 65 "toxics initiative" is setting off a string of potential regulations in at least 15 other states nationwide.

Carl Pope, co-author of the proposition and a Sierra Club member, says that he and Environmental Defense Fund leader David Roe are penning a "generic" model of Prop. 65 for use by other states.

"This is not something that is being pushed out of California," Pope notes. "We are getting questions from everywhere." Pope claims he has received inquiries from a number of states concerning pesticide regulation. Washington, D.C. based National Campaign Against Toxic Hazards is working to set up legislation campaigns in 15 states.

Prop. 65 and proposed legislation in other states are similar. But "these new ones will go further," says Toxic Hazards' John O'Conner.

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ATHLETIC TURF

Toronto decides to go with artificial turf

Despite a strong push by grass backers, the Toronto Stadium Corp. has chosen to use an artificial surface in its new dome stadium. The Toronto dome will be the first in North America with a retractable roof.

Because of the roof's retractability, turf scientists agree that growing turf inside a dome is possible. Jim Watson, Ph.D., vice president of the Toro Co.; Bill Daniel, Ph.D., inventor of Prescription Athletic Turf (PAT); and Steve Wightman, sports turf manager of Denver's Mile High Stadium, addressed grass supporters and the Toronto Blue Jays' management earlier this year in Toronto.

The Stadium Corp. chose artificial turf despite a strong public support for grass. The *Toronto Star* asked readers to vote on the two surfaces. The results showed 4,515 people in favor of natural grass to 34 in favor of synthetic.

A confidential report by the Stadium Corp. stated that they chose artificial because:

- "To grow grass require a daily minimum of 50 percent of available daylight. This represents approximately, on average, six to eight hours of light per day."
- "The grass may not be able to withstand and recover from a series of back-to-back baseball and football games."
- "The natural grass systems require that the stadium not be used for other purposes immediately following the football season when time is required to remove the turf, and before the baseball season when time is required for resodding. There would be a minimum loss of a potential 25 revenue-generating days/year with a P.A.T.-type natural turf system. This would result in a projected loss over the first 14 years of approximately $8.7 million."
- "The estimated cost premium of natural vs. artificial turf over the first 14 years of stadium use is approximately $22 million."
- Plywood or another similar material must be placed over the natural grass to mount most non-sporting events. In the opinion of trade show experts, this would render this project a "second-class trade show facility" and would completely undermine its ability to attract world-class events.
- "There are major operational risks in installing a natural grass system in the Dome stadium. Such an installation would be unprecedented and there are no assurances that the grass would be in a suitable condition for opening baseball games. As no satisfactory warranties or guarantees are available, the Stadium Corporation would be required to assume the full risk for the major liabilities involved."

The testimony of Watson, Daniel and Wightman disputed many of the claims. Lighting depends not only on duration, but intensity of light. PAT marketers say turf would fare well with 35 hours of light per week.

Wightman can convert Mile High from baseball to football in 13½ hours. "We have overnight versatility and yet we have not sacrificed the safety and playability of the field," Wightman said.

Cost is another matter of interpretation. The Stadium Corp. included in its figures a 12-acre nursery at a cost of $700,000. Sod could be grown at existing sod farms or nurseries and brought into the stadium.

Also, a new study by Robert Baade, a Lake Forest (Ill.) College economics professor, says that new stadiums produce few financial benefits for communities. Instead they "realign" economic growth.

Despite a vote of 4,515 to 34 by *Toronto Star* readers, the Toronto Stadium Corp. will put in artificial turf.

SEED

New bluegrasses replace two old Scotts' varieties

Two new varieties of Kentucky bluegrass developed by O.M. Scott & Sons—Coventry and Abbey—will begin replacing Bristol and Victa varieties, respectively, this year.

Coventry, under development since 1970, is an improved variety made from a cross of Gnome and an unreleased Scotts selection. In Scotts' tests, it has shown good shade tolerance and disease resistance. It will replace Bristol, introduced in 1976.

Abbey, developed at the company's Marysville, Ohio, research site, is adapted for both sun and shade. It can be used in a wide range of geographic locations. Abbey replaces Victa, a patented variety introduced in 1973.

Other recent seed introductions from Scotts include Ovation perennial ryegrass and Chesapeake tall fescue. Ovation, developed by Momersteeg International in Holland, was a top performer in recent national winter overseeding trials. Chesapeake, developed from four clones, three of which originated in Atlanta, has shown excellent heat and drought tolerance in Scotts' tests, lowering irrigation needs.

RESEARCH

A healthy lawn works like a sponge

The thicker the lawn, the more water it absorbs, according to research done by Penn State University turfgrass professor Thomas L. Watschke, Ph.D.

This absorption ability helps chemicals do their job, Watschke says.

"High quality turfgrass sites significantly reduce the total runoff," Watschke says. After more than a year's testing, sodded plots had 15 times less runoff than seeded ones. "This indicates that the surface soil structural effects (on seeded surfaces) do not correct themselves quickly," Watschke notes.

The 1,300-square-foot plots were so sponge-like that even under three-inch-per-hour simulated rainfall, not more than a half-gallon a minute came off the plots.

Watschke added that thatch or a large-pored layer of decaying grass on top of the soil provided a buffer to the "inflitration rate characteristics of the underlying soil," helping to reduce runoff.

LAWN CARE

Is chemical lawn care a risk to pets?

It's not uncommon to hear of bird kills from the misapplication of pesticides. But such negligence can also kill larger animals such as dogs and cats.

Dennis Blodgett, D.V.M., Ph.D., of Virginia Tech, says it's rare, but possible to kill animals with lawn chemicals. "In reality, if you dilute and apply chemicals correctly, you won't cause a problem," Blodgett says. "Walking through a yard, the animal won't pick up much because of the footpads."

Birds are more frequently poisoned because they mistake chemical granules for seeds, Blodgett says. Eating a grub killed by an insecticide won't cause a problem.

Dogs and cats are hurt by chemicals when the true cholinesterase enzyme in the nervous tissue is deactivated. The enzyme, which is also found in humans, acts on insecticides in the body and the activity drops off. Organophosphates and carbamates can inhibit cholinesterase in the nervous systems.

Cholinesterase will regenerate in the body, but when regeneration is slower than exposure, the animal is in trouble.

Owners often expose their animals

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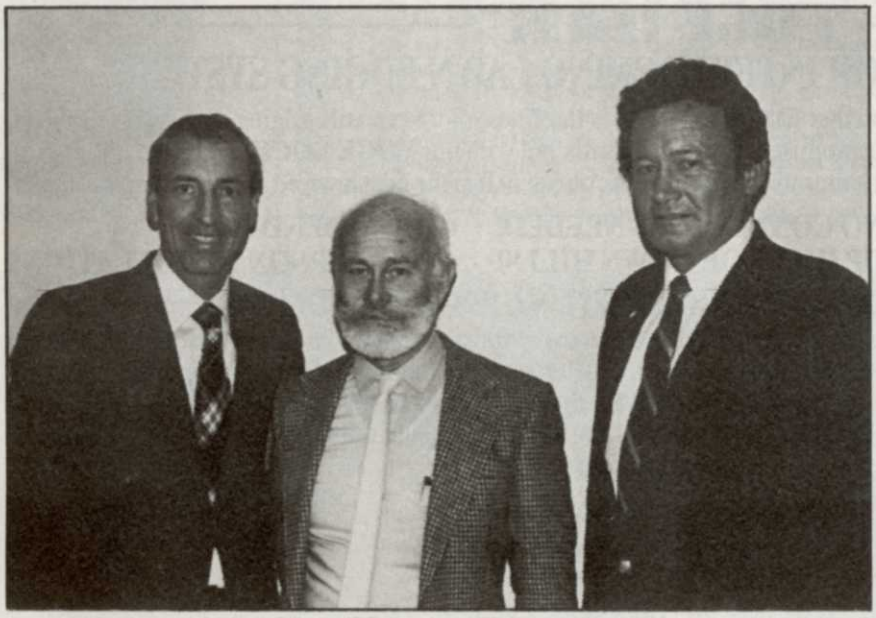

New Musser directors

New directors of the Musser International Turfgrass Foundation, gathered at the GCSAA show in Phoenix earlier this year, are shown above. Left to right, they are Mike Bavier, CGCS, Illinois; Peter McMaugh, Australian turfgrass specialist; and Tom Burrows, CGCS, Florida.

1-2-3

The first time pesticide users actually come in contact with pesticides is at mixing. Therefore, caution must be exercised right at the outset to ensure caution against possible accident situations.

Four steps to mixing safety are pointed out by Bert L. Bohmont of Colorado State University in his book "The New Pesticide User's Guide." They are:

1. Always read the label and be careful to properly dilute the pesticide. Make sure you're working with the proper equipment, that you're wearing protective clothing, and that first aid equipment is available.

2. When handling hazardous pesticides, never work alone.

3. Be sure to mix chemicals in an outdoor or well-ventilated location. Do not position your body over the seal or the pouring spout. Never tear open bags; under certain conditions, dusts and powders can billow up in large concentrations.

4. All quantities of the active ingredient should be measured accurately. Measuring containers and weighing scales should be kept where mixing is done. Measuring containers should be thoroughly washed and rinsed after each use.

"The New Pesticide User's Guide" is available through Reston Publishing, 11480 Sunset Hills Rd., Reston, VA, 22090.

"1-2-3" is a monthly department devoted to handling pesticides "by the numbers."

to chemicals with flea collars, flea dips and injections. But a lawn care chemical could push the animal over the limit.

"As a lawn care person, you could spray and decrease the animal's cholinesterase level only 10 or 15 percent, but you could be the culprit and you'll get blamed for everything," Blodgett warns.

If this happens, Blodgett says the lawn care worker needs to find out how much the owner exposed the animal to other chemicals.

Cats are more susceptible than dogs to chemicals because of their grooming habits and because the enzymes in the body don't handle insecticides as well as dogs.

Problems rarely occur from a normal lawn treatment. The only real problems happen with an incorrect dilution which causes run-off into puddles that the animal drinks from.

To avoid animal poisoning, Blodgett recommends:

- Never apply pesticides if pets are in the yard. Simply refuse.
- Tell the client to keep pets out of the yard until the application is dry.
- Empty and turn over all feeding bowls, water dishes and bird baths.
- Water in granules thoroughly.
- Avoid the creation of run-off puddles.
- Avoid application of insecticide formulations near bird feeders.

You can tell if a pet is poisoned by symptoms such as vomiting, diarrhea, tearing eyes, constricted pupils, salavation, difficult breathing and uncoordination. Symptoms must occur within 24 hours of a lawn treatment to be related.If a poisoning occurs:

- Call a vet and/or poison control center. An injectable drug may be necessary.
- If the vet is not available, and the pet was exposed through the skin, bathe the animal in soap and water immediately. Rinse thoroughly.Be sure to wear protective gloves and an apron.

If the animal ingested the toxin, give it water or milk mixed with one teaspoon to two tablespoons of three percent hydrogen peroxide. Dosage depends on the animal's size. Do not use this treatment in severely depressed animals. Do not use if ingestion is past two hours.

You can also give a dog activated charcoal which can be bought over the counter. Always go by the children's dose on the bottle.

Blodgett spoke at the Landscape Expo in Chicago, Ill.

PARKS

Vandalism a problem for park managers

Jeff Bourne, chief of the parks bureau of the Howard County Department of Recreation and Parks, really knew how to get the people attending his vandalism session at the Landscape Exposition worked up. He just asked them what vandalism problems they had. Bourne did not have to say much after that.

The problems included graffiti, widespread trash, missing signs and a number of other annoyances. But what the vandalism caused most was frustration."People won't use the park if it isn't looking good," commented one attendee. "(The vandals') presence inhibits attendance at the park."

One attendee, who's company does landscaping for a housing development, noted that because of vandalism, when he requested funding for more shrubs, he got an answer like "What's the point? They're going to be torn up anyway."

His solution has been to charge res-

continued on page 16

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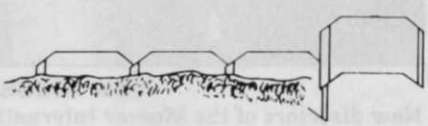

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SHORT CUTS

GOOD ADVICE..... Information on turfgrass management is available to turf care professionals who enroll in the Total Turf Management Program sponsored by Nor-Am Chemical Co. Professionals eligible to enroll include golf course superintendents, turf extension specialists and university personnel with turf programs.

Managers who sign up for the Nor-Am program receive four booklets on various aspects of turf management and reports published throughout the year. Booklets include information on disease control, fertilization, insect control and a calendar guide for turf management. To enroll, contact a local Nor-Am sales representative or write to: Communications Department, Nor-Am Chemical Company, P.O. Box 7495, Wilmington, DE 19803.

ENTER SOON..... Entry deadlines are approaching for three landscaping contests. The 18th Annual ALCA Environmental Awards Program deadline is Sept. 1, 1987. A new category, "Special Event," has been added to this year's competition. For information, contact ALCA at 405 N. Washington St., Falls Church, VA 20046 or call (703) 241-4004.

Deadline for the Florida Nurserymen and Growers Association Landscape Awards Program is June 29. Information on the awards can be obtained from FNGA, 5401 Kirkman Rd., Suite 650, Orlando, FL 32819; (305) 345-8137.

Deadline for the 1987 Amateur Residential Landscaping Competition, a new program sponsored by the National Association of Brick Distributors and the American Society of Landscape Architects, is July 1. Toro will supply prizes for the contest open to homeowners. Complete information and entry forms may be obtained by writing Landscape Contest, Suite 210, 1825 K Street, N.W., Washington, DC 20006, or calling (800) 432-3247.

CRANK ADS..... A new California state bill allows for disconnecting phones of unlicensed contractors who illegally advertise in alphabetical or classified directories published by a telephone corporation. The Contractors State Licensing Board (CSLB) can issue a citation with an order of correction requiring violators to end unlawful advertising and to disconnect phone service to the number displayed in the ad. The California Landscape Contractors Association is encouraging licensed contractors to file complaints against unlawful advertisers. Complaints should be filed with CSLB at P.O. Box 26000, Sacramento, CA 95826.

STRIKE UP THE BAND... Is high school band practice putting excess stress on your football field? Paint lines on the parking lot, says Philedelphia County extension agent Andy McNitt. "They have to have the lines to march," McNitt says. "But if they practice in the parking lot, it can save compaction and wear on the field."

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Chem-Spray South Gonzales, LA (504) 644-2816	Arkansas, Louisiana, Mississippi
Chemi-trol Chemical Company Gibsonburg, OH (419) 665-2367	Indiana, Kentucky, Michigan, Ohio
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Agway, Inc. Syracuse, NY (914) 795-2551	Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, West Virginia
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Along with sweating, sore limbs and painfully long days.

Introducing the Yamaha Terrapro.™ The first ATV with something extra behind it. A rear-mounted PTO.

Or to be more specific, an ASAE standard, 1-inch, 2,000 rpm PTO which operates a variety of mowers and sprayers.

For example, our exclusive Terrapro System of mowers designed for Yamaha by Woods. They trim hours off your workday.

The Yamaha finish mower has three high-lift cutting blades that slice a full 48-inch swath over lawns, golf courses and grounds.

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This is the PTO behind the ATV. It helps you get your work done ASAP.

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With the Terrapro hand-held sprayer you can spray anything from crops to cattle.

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INDUSTRY NEWS *from page 8*

idents at the development for the repairs if they are caught. Usually it is one of the children doing the damage. Bourne's statistics bear this out. The age group most responsible for the damage is the 17-22 year old, mostly in the lower end. And the damage takes away both time and money (about one or two percent of an annual budget) from the landscapers.

"It's a crime," said Bourne. "Criminal activity of a segment of the population that uses our facilities, and it should be treated as a crime." Bourne suggested getting offenders to do community service work in repairing the damage. "Try to get the kids to devote energy to other projects," he explains. A personal interest in the appearance of the park will make the kid less likely to vandalize again.

An attendee from a university said proper planning could reduce vandalism and general destruction. For colleges, he suggesting using large walks, and where shrubs were destroyed by traffic, using Washington Hawthorne as a sharp deterrant to traffic.

For more on park upkeep, watch for the October issue of LANDSCAPE MANAGEMENT.

PEOPLE

Woman super makes the books in Ohio

When WEEDS TREES & TURF ran an article on women golf course superintendents last December, we received a number of letters from women who had been overlooked. One woman, Jean Esposito, ran Hinkley Hills, a public course right down the road from our offices.

Now Esposito has made Ohio golf history by becoming the first woman president of the Northern Ohio GCSAA chapter. The chapter of 270 (only two members are women) elected Esposito vice president last November. She became president when the previous president took a job in California.

Esposito's parents Donald and Beatrice Krush built the course on a family farm in 1964. It is still a family-run business. Esposito's husband works as her assistant, while her sister manages the clubhouse.

CONFERENCES

Expo plans to draw 20,000 attendees

The fourth annual International Lawn, Garden & Power Equipment Expo next month will draw more than 20,000 participants, according to the public relations agency handling the event.

Almost 260,000 square feet of exhibition space has been sold for the Expo, to be held in Louisville, Ky., July 27-29. Thirteen football fields would not fill that much space.

Howard K. Smith, one of America's most distinguished broadcasters, will be headline speaker. Singer Wayne Newton, a top Las Vegas entertainer, will also give a performance.

For more information, call (800) 558-8767. (In Kentucky or outside the continental U.S., call (502) 582-1627.)

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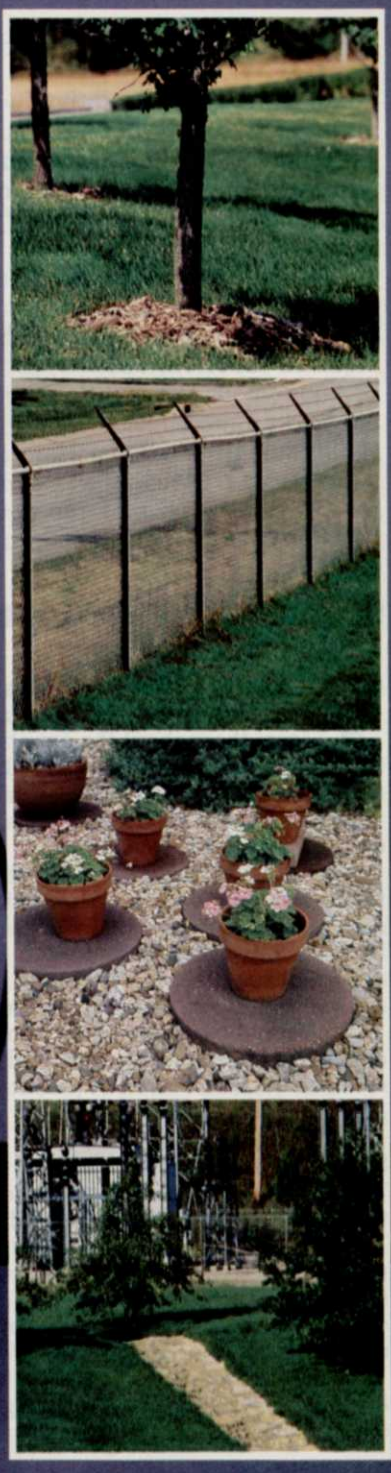

COVER STORY

SAFETY TO THE MAX

In September 1986, WEEDS TREES & TURF exclusively reported the story of a college baseball player's death on a synthetic field. The case raised questions which apply to the natural turf industry. In this issue we examine how to accurately measure the safety of fields. This test, although technical, may help you avoid a lawsuit.

by Heide Aungst, managing editor

Editor's note: Scott Halbrook was a 19-year-old freshman on a baseball scholarship at Oregon State University in Corvallis. On March 2, 1982, Oregon's rainy weather forced the team away from the natural practice field onto the AstroTurf football field at Parker Stadium.

Scott, playing left field, collided with the shortstop while running for a short pop fly. The collision knocked Scott backwards. His head hit the AstroTurf. He never regained consciousness.

Anonymous phone calls about the poor conditions of the field prompted Scott's family to hire attorney Dan Holland of Eugene. The Halbrooks filed suit against AstroTurf manufacturer Monsanto, Sports Install Inc. a subsidiary of Monsanto and Oregon State University. The parties settled out of court in September 1985.

GLOSSARY

The following is a glossary of terms used in the measurement of hardness:

***Acceleration*: The instantaneous time rate of change of velocity which may be positive or negative.**

***G*: The ratio of the magnitude of missile acceleration of gravity, expressed in same units.**

***G-max*: The maximum value of *G* encountered during impact.**

***Severity Index*: An arbitrary parameter equal to the integral of $G^{2.5}$ times distance times time over the total duration of impact.**

The story of Scott Halbrook's death on a college athletic field sent shivers down the spines of field managers throughout the country.

Some natural turf managers shrugged it off since the death occurred on a synthetic surface. Others immediately recognized the ramifications that such a report could have on the natural turf industry.

Natural turf researchers had been looking at making fields safer for several years before the Halbrook case reached the public. But by speaking out, attorney Dan Holland and Scott's father Alan Halbrook got others to recognize that field safety should be a universal concern, not one confined to the artificial turf industry.

This new-found awareness, combined with the liability crisis threatening to doom school athletic programs, has sent scientists in search of practical measurements to set guidelines for field safety.

Setting a standard

The place to start in setting a standard, say researchers, is to look at what already exists. The American Society of Testing Materials (ASTM) has set a test standard (F-355) for measuring the hardness of surfaces. ASTM defines their test method as *the measurement of certain shock-absorbing characteristics, the impact force-time relationships, and the rebound properties of playing surface systems.*

The standard further states, "*this test method is applicable to natural and artificial playing surface systems and to components thereof.*" Although three procedures exist for doing the test, the most common used on sport surfaces is *Procedure A*, which uses a cylindrical 20 lb. missile with a 20-inch circular flat metal face.

The problem is that most natural field managers have never heard of the test standard or the terminology used in determining hardness levels. Those natural field managers who are aware of the ASTM test may have learned the hard way.

"The only time I've tested a natural field is when there's a lawsuit," says Dick Schefsky, with Northwest Laboratories in Seattle, Wash. "We test artificial turf all the time. We can use the same equipment to test natural turf."

Dissecting the test

Before field managers can truly understand the importance of cultural practices, such as aerating and mowing, they must understand the basic prinicipals of shock absorbancy properties on playing surfaces, and the test which determines this. Schefsky says it's important to know this not just for football players, but for cheerleaders and other sports participants who may fall unprotected onto the surface.

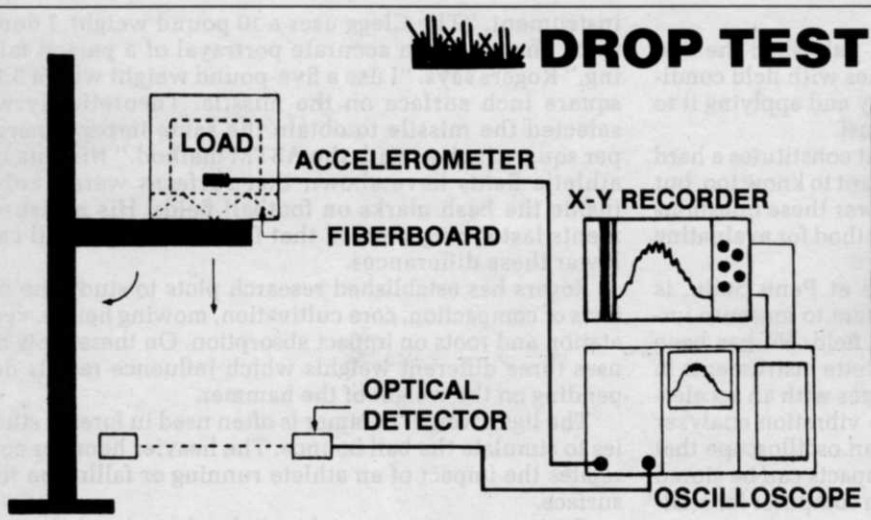

Figure 1: An optical detector triggers the scope. The acquired signal is then fed to the floppy disk and an X-Y recorder for permanent storage.

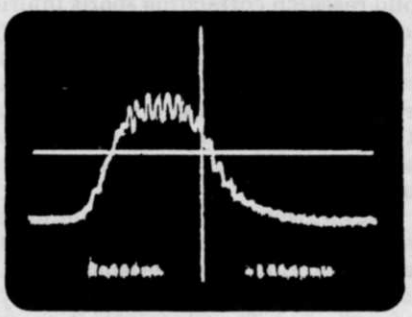

Figure 2: Impact pulse from one drop

"The deceleration of a falling body that impacts on a surface is one measure of impact absorption," says Don Waddington, Ph.D., soil scientist at Penn State University. "A hard rigid surface would stop the falling body quickly and would absorb little of the energy upon impact. A softer surface has a lower peak deceleration and absorbs more of the energy."

Perhaps a simpler way to understand the test is to imagine holding your arm out stiff and having a baseball thrown at it. If you don't move your arm as the ball hits it, it will sting. But if you move your arm and stop it back by your ear, the hit won't seem as hard because you're actually slowing down the stopping action over a longer period of time.

Not moving your arm simulates a hard surface with a high G-*max*. Moving your arm represents a softer surface, with a lower G-*max*.

The ASTM test is done by impacting the surface at a specified velocity with a missile of given mass and geometry. An accelerometer mounted in the missile monitors the acceleration. An accelerometer is a device which produces a voltage porportional to the acceleration it senses. Northwest uses an accelerometer from Vibro-meter Corp. of Billerica, Mass.

The acceleration of the impact is recorded with the aid of an instrument called an oscilloscope, that is an electronic instrument, like a television screen, which gives a visible trace of the voltage vs. time.

When Northwest Labs perform the test, they drop the missile at three different locations on the field. The drop test instrument includes the missile that has an accelerometer attached to it. An electrical signal emitted from the accelerometer is a measure of the deceleration of a missile when it impacts the surface.

The missile falls past an infra-red photoelectric eye. This optical detector and the accelerometer are hooked into an oscilloscope. A recorder attached to the oscilloscope will record the pulse of the drops (see diagram).

This pulse forms a bell-shaped curve. The points on this curve are Gs (gravities). One G equals the acceleration due to gravity. The peak of this curve is called the G-*max*. The G-*max* is what's looked at as the hardness level.

Another example Schefsky uses to explain the test in simple terms is to drop a ball bearing on a piece of steel. The ball bearing will bounce straight up because the surface won't absorb the shock. But if you drop the ball bearing on a pillow, it won't bounce because the soft surface absorbs the shock. The first example would have a high G-*max* reading. The second would have a lower G-*max* reading.

After taking the readings in the field, Northwest Labs plugs them into a computer program which reads out the actual deceleration rate. The sophisticated digital oscilloscope (Nicolet Instrument Corp, Madison, Wisc., Model 3091) which Northwest uses, allows them to keep the field readings on a "bubble memory cassette" to be re-examined in the lab.

The price of such equipment, approximately $5,300 for a digital oscilloscope and about $500 for an accelerometer, puts it out of the range of most school systems. The cost of purchasing such equipment must also include the guide system, fabrication of a missile, and a recording system. A computer and software program to figure the acceleration is also necessary.

The test and lawsuits

An independent lab can do the testing much cheaper than buying the equipment. Testing fields regularly at a low cost and correcting hardness problems could help school systems avoid major lawsuits and obtain insurance more easily.

"It's desirable to get a third party to do the test," Schefsky says. "I have no stake in the outcome. Third party testing lends credibility for insurance or legal purposes."

Schefsky says Northwest Labs is the only independent lab that he knows of with a portable system. Northwest's specialists will go anywhere in the country for $575 plus travel expenses.

"You have to put it into the budget," Schefsky says. "But if somebody does get injured, at least you will not have been remiss."

continued on page 20

SAFETY *from page 19*

Natural turf's impact

Penn State University, which in 1984 published the first solid research correlating sports injuries with field conditions, is taking such known technology and applying it to the special considerations of natural turf.

"Many people are interested in what constitutes a hard or soft field," Waddington says. "We want to know too, but at the same time we are trying to answer these questions we are also trying to develop a good method for evaluating surfaces."

Trey Rogers, a doctoral candidate at Penn State, is working on developing a portable system to measure impact absorption characteristics in the field. He has been using a Clegg impact tester from LaFayette Instruments in Lafayette, Ind. The Clegg impactor comes with an accelerometer. He attaches this to a portable vibration analyzer (Bruel & Kjaer type 2515), which has an oscilloscope that displays the impact curve. Up to 50 impacts can be stored on the analyzer before unloading into a computer for analysis.

Rogers has made some of his own modifications in the instrument. "The Clegg uses a 10 pound weight. I don't think that gives an accurate portrayal of a person falling," Rogers says. "I use a five-pound weight with a 3.14 square inch surface on the missile. Theoretically we selected the missile to obtain the same impact energy per square inch as with the ASTM method." His data on athletic fields have shown that surfaces were harder inside the hash marks on football fields. His measurements last spring showed that frost heaving of soil can lower these differences.

Rogers has established research plots to study the effects of compaction, core cultivation, mowing height, vegetation and roots on impact absorption. On these plots he uses three different weights which influence results depending on the weight of the hammer.

The light-weight hammer is often used in foreign studies to simulate the ball bounce. The heavier hammer correlates the impact of an athlete running or falling on the surface.

Critics argue that natural turf's hardness level changes whether it's wet or dry. "You can still find out what the

continued on page 24

G-MAX TEST* *(Northwest Laboratories, Seattle, Wash.)*

Report to: X Stadium
Report On: Artificial Turf

Date: October 29, 1985
Lab No.: E 33859

TEST:

ASTM F355-78
"Shock-Absorbing Properties of Playing Surface Systems and Materials"

Test Site: X Stadium,
Surface: Artificial Turf cemented to resilient pad.
Test Date: September 9, 1985

Test Location Temperature Data	Drop	Time to G max (milliseconds)	Deceleration G's	Severity Index
30-yard line (N.E.)				
Relative Humidity-67%	2	6.0	113	393
Air Temp. 49°F	3	6.0	122	410
Field Temp. 52°F	4	5.5	128	421
Average (Drops 3 & 4)		5.75	125	415.5
50-yard line				
Relative Humidity-57%	2	6.5	116	389
Air Temp. 70°F	3	6.5	104	322
Field Temp. 75°F	4	6.5	108	344
Average (Drops 3 & 4)		6.5	106	333
30-yard line (S.W.)				
Relative Humidity-54%	2	6.5	108	344
Air Temp. 67°F	3	6.5	110	367
Field Temp. 71°F	4	6.0	108	322
Average (Drops 3 & 4)		6.25	109	344.5

INSTRUMENTS:

Manufacturer	Model Number	Serial Number
Oscilloscope:		
Nicolet	3091	84D00624
Accelerometer (Piezoelectric):		
Vibro-meter Corp.	501ER	453

*Although this particular test show G-max levels on a synthetic surface, Northwest Labs will perform tests on natural fields.

POP QUIZ

1. WHAT DO YOU CALL A TALL FESCUE THAT LOOKS LIKE BLUEGRASS?

- ☐ KENFESCUE BLUEGRASS
- ☐ TALLTUCKY GRASS
- ☐ BLUE FESCUE
- ☑ MUSTANG TURF-TYPE TALL FESCUE

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You'll admire Mustang's beautiful bluegrass-like qualities; the finer leaf texture, rich dark green color and dense uniform turf.

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You may know about Mustang already, but it's well worth repeating: For bluegrass beauty and tall fescue practicality there's nothing like Mustang turf-type tall fescue.

Pickseed also produces Fiesta PERENNIAL RYEGRASS and BANFF Kentucky Bluegrass and other fine turf grasses available nationwide from quality seed suppliers.

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1 NEW BANNER® GIVES YOU LONGER LASTING CONTROL OF DOLLAR SPOT AND BROWN PATCH.

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Because of its systemic action, one spraying of Banner lasts 14 to 21 days on brown patch. And provides up to 28 days of excellent control on dollar spot at a 2 oz. rate.

2 SYSTEMIC, PREVENTIVE CONTROL.

Now you can stop disease before it gets started. Banner works systemically to control disease from the inside out. Once Banner is quickly absorbed by the leaf and root system, it won't wash off. It keeps on working after drying, unaffected by rain or irrigation.

Banner also goes on to prevent powdery mildew, rust, anthracnose, red thread and stripe smut.

wait to put Banner on the spot.

3 LOW RATES, LOW COST PER DAY, FEWER SPRAYS.

Banner's new chemistry is so powerful, just 1 to 2 ounces per 1,000 square feet is all you need.

These low rates and long residual mean lower cost per day of control. Less chemical, low rates and long residual also mean Banner performs with fewer applications which makes Banner the preferred treatment where environmental considerations are important.

Put Banner on the spot. And get longer lasting, systemic control of dollar spot and brown patch.

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Circle No. 107 on Reader Inquiry Card

SAFTEY *from page 20*

optimal condition should be," Schefsky says. Rogers agrees that his research could lead into sports turf managers knowing what cultural practices to use, such as watering to soften the field.

What's safe?

ASTM has given labs and artificial turf manufacturers a standard to follow in performing tests. But they qualify the test with this statement: *This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of the standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

But what does it mean to the turf manager or player safety?

One major synthetic turf manufacturer has determined that *G-max* levels using a 20 lb. missile dropped from 24-inch height of "good grass" is about 75-100, while frozen earth is about 275. This manufacturer aims for the product to have a *G-max* of 200 using the 20 lb., 24-inch test.

Except for the current work by Rogers and Waddington, no one in the natural turf industry has set *G-max* guidelines for natural fields.

"What are we talking about here?" Holland says. "What's safe? Do you fall from 24 inches or do you fall from your height?"

"It would be nice to write a specification and say 10Gs is safe," says Roger Schmidt, who's in research and development for Uniroyal and on the ASTM sports committee. "But it needs to be technically and logically feasible."

In a new standard which ASTM is proposing for playground surfaces, *G-max* levels will be taken at one foot intervals so that manufacturers can compare the values to the height of the equipment.

Still, Schmidt admits that *G-max* levels alone mean very little.

The severity index can better determine effects on player safety. "Instead of looking at just the maximum force, the severity index looks at a time interval of the force applied," explains Schmidt. "Severity index is more complicated to calculate and more related to head injury."

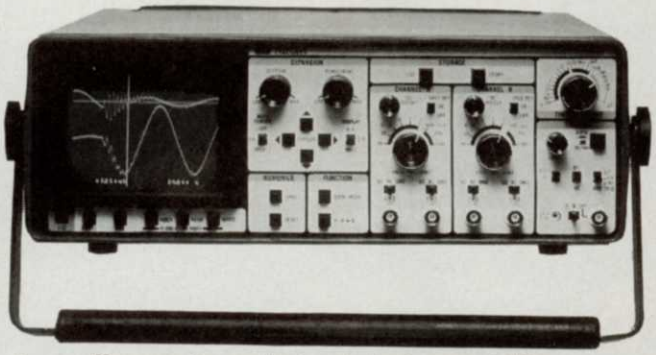
continued on page 26

G-MAX VALUES

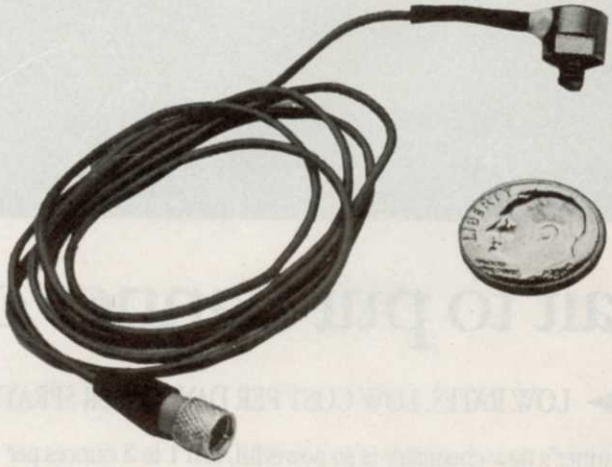
A major synthetic turf manufacturer has assigned these G-max values using F-355, to the following conditions:

Hard frozen earth/gravel	275
Hand-packed dry earth or "Normal" frozen soil	175-200
P.A.T. system	125-140
"Good" grass	75-100
Soggy, wet grass	70-75

Penn State University uses a Clegg impact tester and vibration analyzer with three different weights for their impact absorption research.



An oscilloscope is an electronic instrument, like a television screen, which gives a visible trace of the voltage vs. time.



An accelerometer is a device which produces a voltage porportional to the acceleration it senses.

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in the rough on the green

You get the best of both worlds with the New Holland LB-620. A tough, articulated loader/backhoe that's easy to operate in rough spots and tight spaces. And, a lightweight low-profile design, with a softer touch on turf.

Balanced design

The low-profile design distributes the weight over each drive wheel for full ground contact and a softer touch on turf. Positive four-wheel hydrostatic drive combines with four-way articulation to give you the flotation and traction you need in rough spots and soft spots, and adds extra stability on slopes and rough terrain.

With a tighter turning radius, and a lower profile, the LB-620 works in spaces that are too tight for other loader/backhoes.

Deep digging— high dumping

Powered by a 53-hp diesel engine, the backhoe has a digging force of more than 10,000 pounds, and digs 11′-13′. The 5/8 cubic-yard capacity loader moves into the load with a breakout force of 6,442 pounds. Dump height is more than nine feet.

Easy transport

The compact LB-620 makes job-to-job transport easier, too. You tow it on a trailer behind a one-ton pickup. Yes, the LB-620 takes on the toughest jobs—but works with a soft touch. Ask your New Holland dealer for a demonstration, or write to Ford New Holland, Inc., 500 Diller Ave., New Holland, PA 17557.

Ford
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SAFETY *from page 24*

Severity index

Severity index takes into consideration the Gs as well as the time over which the force is applied.

"Studies show that a person can tolerate a hard surface for a short amount of time. That's usually figured in milliseconds," Schefsky explains. In other words, if the surface absorbs the shock of the impact quickly, then that surface may not be as "hard" to a human body as a surface which absorbs the impact slower. One surface with a G-max of 200 may have a higher severity index than another surface which peaks at 200Gs.

Most standards such as ASTM and the severity index are based on head injuries. Original tests in this area dealt with heads hitting automobile dashboards.

Some researchers went as far as dropping animals on surfaces and even cadavers. "What damage occurs in a cadaver's head may be undetectable, while it could produce a concussion in a human being," says Bruce Martin, Ph.D., of the biomechanical engineering department at the University of California at Davis. Martin, along with Dr. Douglas Bowers of West Virginia University Medical Center, completed perhaps the study most critical to the natural turf industry on impact absorption of natural vs. artificial surfaces.

The 1974 test showed that five-year-old synthetic turf was almost as hard as asphalt, while bluegrass sod provided a softer surface. Bowers had planned to re-do the test this year, but the field he had been testing was ripped out. His plans are currently on hold.

The future

Rogers' impact absorption research, along with the work of other turfgrass scientists on turf strength and cultural practices will have profound effect on the future of the athletic turf industry.

"There are many things it could do," Rogers says. "I think we'll start seeing more people in the athletic field service industry. It's cheaper for schools to hire out for services. I think we need this research for athletes and parents of kids at the high school and junior high school level."

"There are many variables to be considered," adds Waddington. "We don't have the resources to do everything at once, but we are making progress." **LM**

PRACTICE MAKES PERFECT

It's an ironic situation, but it happens at schools everywhere: athletes spend more time on practice fields, while turf managers spend more time on game fields.

In 1984, Penn State University researchers published the first study correlating field conditions with player injuries. The researchers found that more injuries happened on practice fields, and that turf managers work less on those fields.

Since the publication of that study, the hardness issue also has come to the forefront of athletic turf management. The two issues combined have given athletic field researchers a new perspective on field management. While natural turf managers need to be aware of "G-max" levels on game and practice fields, the actual turf surface also is a concern.

Matt Leonard and Steve Cockerham look over the traffic simulator they created to produce wear on athletic field research plots.

Rich Henderson, who completed a masters thesis at Penn State in August, looked at the impact absorption properties of various surfaces. "Rich laid the groundwork for my research," says Trey Rogers, a doctoral candidate at Penn State. "He did his research in the lab, while my system is portable."

Henderson's results show that the presence of bluegrass sod on clay and coarse sand soils made the surface softer, but had little effect on a silt loam soil. A turf cover of 60-day-old ryegrass on the silt loam was softer than bare soil. Core cultivation decreased surface hardness of a silt loam soil.

The drop-test instrument used to measure impact absorption is not the only instrument which is important in evaluating turf strength.

Henderson also looked into the use of the pentrameter, a device which is pushed into the soil and measures the force per unit area.

Turf density, soil moisture and bulk density influenced the ease of pushing it into the soil. Turf density influenced a pentrameter with a 1.0 or 2.0 sq. cm. cone, while bulk density influenced a 0.25 or 0.50 sq. cm. cone. The 1.0 sq. cm. cone correlated best with soil moisture.

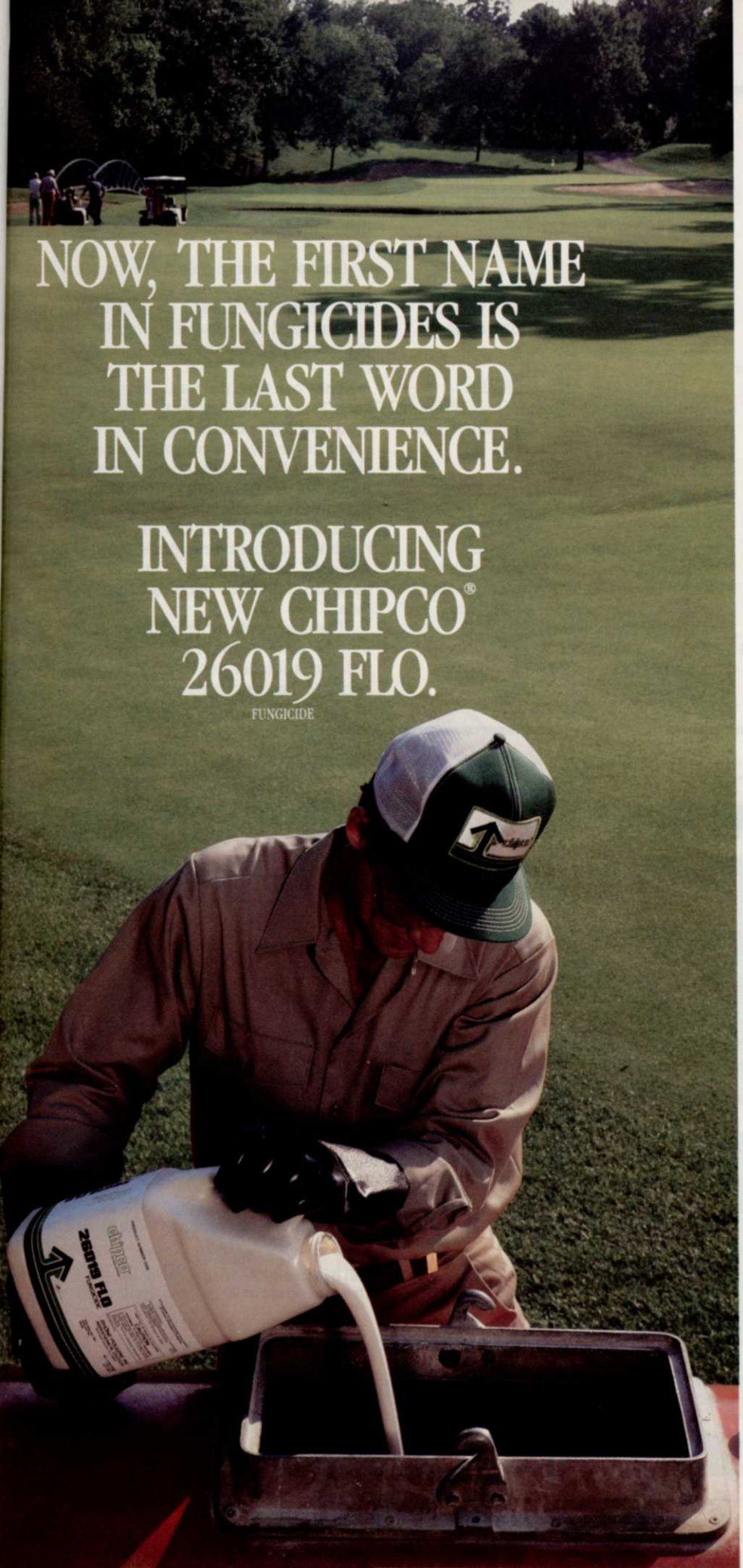
More research

Another problem researchers face is simulating actual field conditions on research plots. In order to do this for athletic turf, Steve Cockerham, superintendent of ag operations at the University of California-Riverside developed a "traffic simulator."

Cockerham says the invention evolved from "25 to 30 ideas" from other researchers across the country.

"Visualize the center of a football field," Cockerham explains. "It's torn up and compacted. In trying to develop new grasses you have to duplicate the wear of a football player over a plot. You can't tell a turf manager what to do if we're evaluating turf under different conditions than he lives with."

continued on page 28



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312-858-9500

Reprints of the September 1986, WEEDS TREES & TURF are available for $1 from Business Information Services (216) 826-2839.

The booklet *Athletic Fields—Specification Outline, Construction and Maintenance* is available from:
John C. Harper II, Ph.D.
Dept. of Agronomy
Penn State University
University Park, PA 16802

The booklet *Athletic Field Construction and Maintenance* by D.H. Taylor, G.R. Blake and D.B. White are available for $1 from:
Distribution Center
Extension Service
Coffey Hall
University of Minnesota
St. Paul, MN 55108

PRACTICE *from page 26*

The machine consists of two steel rollers, one foot in diameter with cleats welded to the rollers and connected by bike chains. The rollers move at different speeds.

The traffic simulator hooks onto a Kubota tractor. It is run over plots at different rates to imitate different conditions.

Cockerham and his colleagues are testing a Bermudagrass plot built as a sand sports field; various cool-season species used to overseed Bermuda; and tall fescue which represents golf fairway turf.

They can then test cultural practices, such as irrigating and fertilizing, to tell which will give an athletic field manager a healthier field. Preliminary results show that *Poa trivialis* on common Bermuda wears out rapidly, while Caliente perennial ryegrass holds up to wear best.

"I don't think you can say whether hardness or shear strength is more important," says Rogers. "They both go hand-in-hand in developing a good surface.

The answers to athletic turf problems may be slow in coming, but new technology, such as accelerometers and oscilloscopes, pentrameters and the traffic simulator, will provide safer turf in the future. **LM**

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Circle No. 106 on Reader Inquiry Card

THREE STRIKES YOU'RE OUT!

A LANDSCAPE MANAGEMENT survey paints a bleak picture for athletic field managers. But some innovative managers are changing the scene.

by Heide Aungst, managing editor

Lack of community support, low budgets and over-scheduling fields are three stikes against even the best athletic field managers.

"When a field goes bad we receive negatives, but no support," says Bill Dunn, parks and recreation director in Medina, Ohio. "We're expected to have the fields in good shape."

"They just want an area to conduct their events," echoes Bob Marchesano, landscape grounds administrator at California State University in Long Beach.

Most of the field managers in a LANDSCAPE MANAGEMENT survey complained about minimal community support. But one had a different story to tell.

"It's excellent," says Harry Gross, parks director in St. Petersburg, Fla. "The leagues assist in renovations."

Gross is responsible for six acres at a softball complex, seven acres at a baseball complex and 21 acres of soccer fields. They are used about 9,300 hours year-round. "There is no off-season in Florida," Gross says.

Reviving renovations

Every five years, Gross and his crew of five for athletic fields (18 overall) completely renovate the Bermudagrass/sand fields. The renovation includes removing the existing turf, regrading the area and sodding or sprigging. Cost is about $12,500 to sod; $7,000 to sprig.

Some respondents never renovated fields. Others renovate only when problems arise. Still others have regular renovation programs.

One respondent, Rod Perry, landscape supervisor at a community college in Marysville, Calif., renovates baseball fields every two years. He spends about $5,000 to regrade, topdress, reseed and upgrade the drainage systems.

Every five years Perry renovates football fields for $2,500; softball every two years for $1,000; and track every five years for $1,500.

He says his fields are used up to seven days a week, 10 months out of the year. His crew of three spends about 20 hours a week on the fields.

Henry Indyk, Ph.D., of Rutgers University has compiled some of the first statistics on field renovation (see table). A complete field excavation and replacement costs between $167,000 and $223,000. Indyk worked with consultants who reconstructed high school fields in New Jersey to get his figures.

Most field managers spend well below $167,000 for field renovations, when they renovate at all. Indyk says he doesn't have figures for field maintenance.

Maintenance budgets varied greatly among survey respondents. School budgets often included the surrounding landscape, while park budgets included everything from public cemeteries to roadsides. Respondents said it was difficult to break out figures for chemicals and equipment used solely on athletic fields. But the average annual budget among respondents—including labor, equipment and chemicals—was $63,991.

Budgets seemed to correlate with community support. When support was low, so was the maintenance budget.

Injuries

Support from coaches and athletic staffs got a mixed review from respondents. Tom Rudberg, grounds supervisor at a college in St. Paul, Minn., says he feels coaches and athletic directors need information to understand the problems and procedures in maintaining and renovating fields.

"I now have the coaches and athletic director justify and budget for major work on athletic areas," Rudberg says. "If they don't like the condition of a field, then they are responsible to correct the problem. I am used as a consultant and estimator. If a project is approved, then I oversee it. If it is not approved, then it is not my problem, but the athletic director's. This makes the athletic department realize the total actual cost of their fields."

Doug Jacobs, superintendent of parks in Sterling, Ill. says his coaches point out areas which may cause injuries to players.

Most respondents agreed that ankle sprains and knee injuries are the most common natural field-related injury.

In order to prevent such injuries, managers perform a variety of cultural practices. "We aerate often in order to eliminate compaction," says Dunn. "Grass is mowed according to sport and weather conditions.

"We try to keep turf areas even and consistent," Marchesano says. "We have been replacing old brass heads with new plastic pop-up rotors."

"We have formal and informal inspections on a scheduled basis as part of the department of safety program," says Walter Stasavich, superintendent of parks in Greenville, N.C.

A standard?

Respondents varied in their opinions of setting a standard for natural fields. "I would like to have a national non-profit organization (not government), research, develop, and promote standards," Stasavich says.

"I do not believe an effective determiner could be set up which would hold up in court," disagrees Gross.

"Ideally, yes, but it's not practical in our case," says Jack Cook, a high school grounds foreman in Ferguson, Mo. "We have neither the time nor funds available to correct problems."

"Yes, it would reduce injuries and allow athlete's some constitency (practice fields vs. playing fields)," says Marchesano. "This could be done by possibly an egg drop test or some type of pressure compaction test."

Field management problems may vary between warm-season and cool-season turf areas and depending on the soil type, but most managers face the same challenges.

LM

FIELD COSTS: NATURAL vs. ARTIFICIAL

by Henry Indyk, Ph.D., Rutgers University

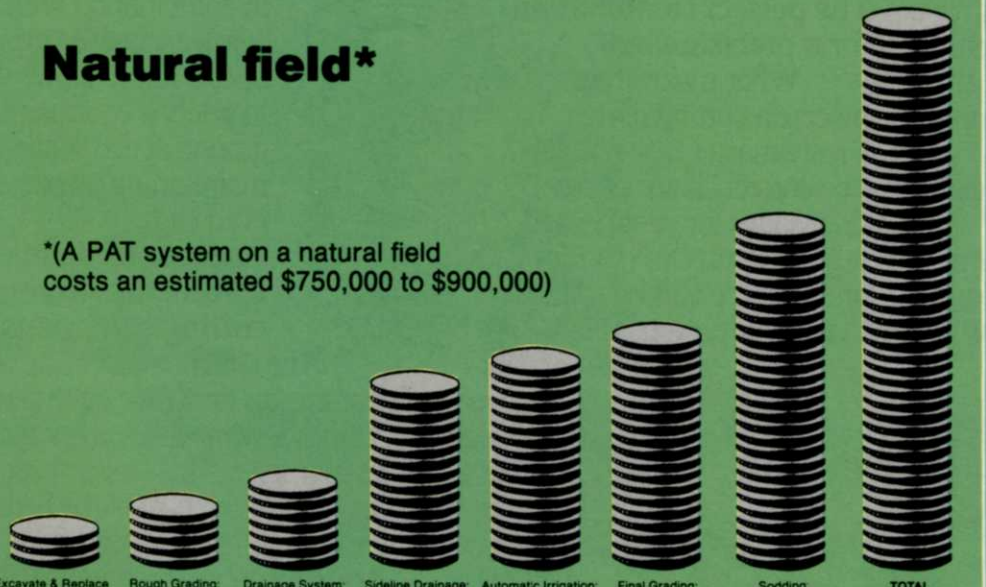
ESTIMATED FIELD COST BASED ON A 20-YEAR LOAN AT 12 PERCENT INTEREST.

Natural:		Synthetic:	
Principle:	$250,000	Principle:	$1 million
Interest:	$315,000	Interest:	$1,260,000
Total:	$565,000	Total:	$2,260,000
AVERAGE ANNUAL COST:	$28,250	AVERAGE ANNUAL COST:	$113,000

(Editor's note: It's important to note that this is based on a 20-year loan . . . studies prove that artificial surfaces must be replaced after about five years.)

Natural field*

*(A PAT system on a natural field costs an estimated $750,000 to $900,000)


Excavate & Replace 12-inches of soil: $67,000 to $81,000
Rough Grading: $8,000 to $12,000
Drainage System: $30,000 to $38,000
Sideline Drainage: $10,000 to $25,000
Automatic Irrigation: $24,000 to $32,000
Final Grading: $3,000 to $5,000
Sodding: $25,000 to $30,000
TOTAL Estimated Cost: $167,000 to $223,000

Synthetic field

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Most greensmowers can live up to your highest expectations. But only the industry leader, the Greensmaster 300, can live up to your lowest.

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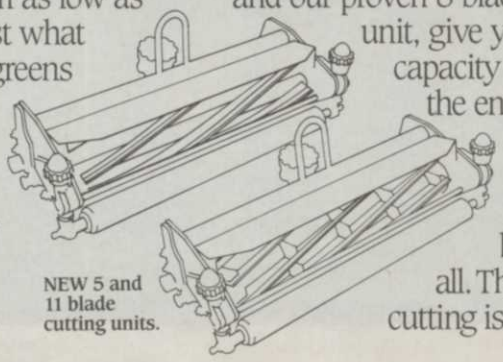

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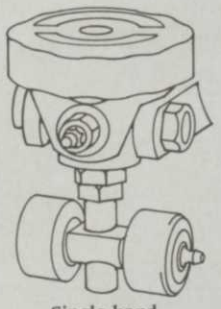

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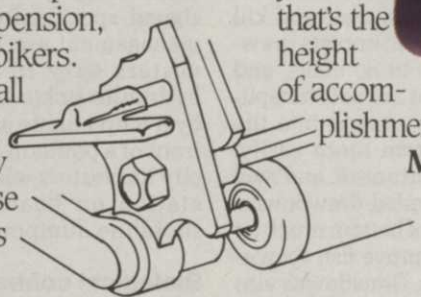

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Greensmaster 300.

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Circle No. 150 on Reader Inquiry Card

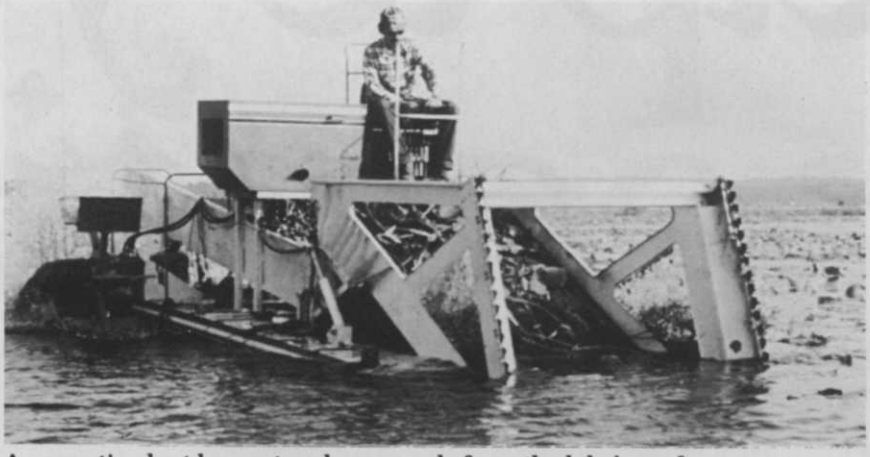
AQUATIC WEED CONTROL

Use of aquatic herbicides is just one of five means of controlling water weeds. But three cooperative extension agents in Florida think it offers advantages the others don't.

There are five major means of aquatic weed control:

- by fertilization;
- by drawdown;
- with mechanical devices;
- with biological controls; and
- with chemical controls.

The following information was excerpted from "Weed Control in Aquaculture and Farm Ponds" by D.D. Thayer, W.T. Haller and J.C. Joyce of the Florida Cooperative Extension Service.



An aquatic plant harvester clears weeds from the lake's surface.

Fertilization

The theory behind a pond fertilization program is that phytoplankton (microscopic algae) populations increase as a result of the controlled addition of fertilizer nutrients until light penetration is reduced below the level required for growth of submersed weeds.

Before beginning a fertilization program for weed control, consider the following:

1) Once a fertilization program has begun, you must always continue the program or face possible severe weed problems.

2) Some weeds, such as hydrilla, have been shown in Florida to out-compete phytoplankton communities for nutrients, thereby making the weed problem worse. It is therefore imperative that fertilization should not be initiated until current weed infestations have been totally controlled.

3) If the fertilization of a pond is intended to be used to stimulate food production in an aquaculture pond, then additional weed control with herbicides or with weed-eating carp *Ctenopharyngodon idella* may be beneficial.

Most fertilization recommendations suggest adding inorganic fertilizer every two weeks until a shiny object placed 18 inches below the surface is no longer visible. Once this level of phytoplankton is obtained, maintain that level with periodic fertilization. The optimum pH should be at least 6.5 or higher, and liming may be required prior to fertilization.

The best time of year to begin a fertilization program is in the spring before aquatic weeds have begun to grow.

Drawdown

Water level fluctuation or pond draining can be used very effectively if the conditions are favorable. Exposing the bottom of the pond to the atmosphere will solidify suspended mud and consolidate bottom sediments to a watertight condition. Excessive nutrients suspended in the water column will be diluted as a result of the water exchange.

In order to have a successful drawdown, you must leave the water level down long enough to desiccate and kill submersed plants. An incomplete drawdown may have little to no effect, and some plant species that are not susceptible to drawdown may spread into the de-watered lake bottom more easily. Cattails are often opportunistic and may establish during extended drawdowns.

The consolidation of bottom muck by drying should also improve fish spawning and nursery areas. Drawdowns also increase options for chemical weed control. Some herbicides are only labeled for use on drained pond bottoms; treatments at this time often provide several years of weed control because the herbicides are bound in the bottom sediments.

Mechanical control

Mechanical control involves the physical harvesting of vegetation by hand or with specifically engineered equipment. For the owner of a small pond, mechanical control can be helpful for removing small populations of nuisance plants.

While the simplest mechanical harvesting devices are often the cheapest and often highly effective, commercially-made harvesters designed specifically for aquatic weed management are available. The harvesters vary in size from simple hydraulic sickle-bar cutters powered by a 5 hp engine and mounted on the front of a pontoon boat to 10,000-capacity harvesters which convey cut vegetation on board for transport to shoreline dumping sites.

Biological control

Ideally, the best weed control agent is

continued on page 36

Troubled waters?

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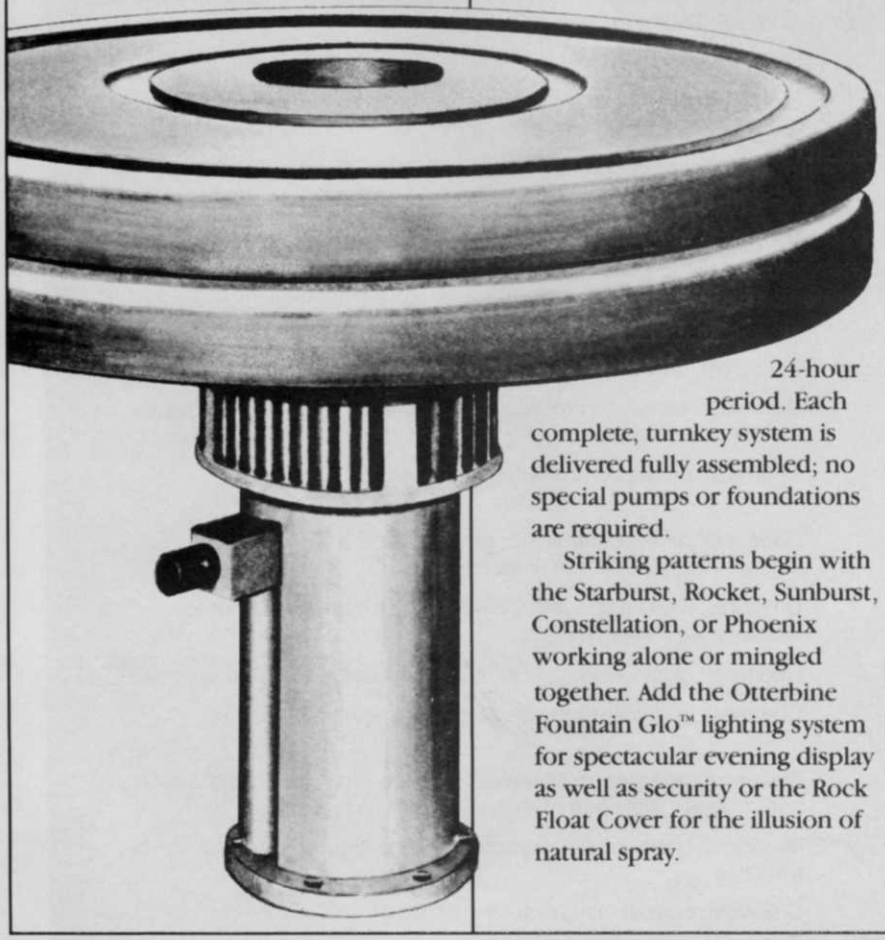

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Circle No. 104 on Reader Inquiry Card

AQUATIC WEED	CONTROL
FLOATING PLANTS	
Common duckweed *(Lemna minor)*	Biological; grass carp. Chemical: diquat, simazine, 2,4-D LV ester, fluridone.
Common salvinia *(Salvinia rotundifolia)*	Biological: partial control with grass carp. Chemical: diquat.
Waterhyacinth *(Eichhornia crassipes)*	Biological: partial control with hyacinth weevil and fungus. Chemical: 2,4-D, 2,4-D + dicamba, diquat, glyphosate.
Waterlettuce *(Pistia stratiotes)*	Chemical: diquat, endothall liquid.
EMERSED PLANTS	
Pickerelweed *(Pontederia lanceolata)*	Biological: partial control with grass carp. Chemical: 2,4-D, 2,4-D + dicamba.
Alligatorweed *(Altermanthera philoxeroides)*	Biological: alligatorweed flea beetles and thrips; partial control with grass carp. Chemical: partial control with 2,4-D, 2,4-D + dicamba, glyphosate.
Cattail *(Tyhpa species)*	Chemical: 2,4-D + dicamba, diquat, glyphosate, fluridone, dalapon.
Pennywort *(Hydrocotyle unbellata)*	Chemical: 2,4-D + dicamba, diquat, 2,4-D.
Smartweed *(Polygonium hydropiperoides)*	Chemical: 2,4-D + dicamba, glyphosate, 2,4-D.
White water lily *(Nymphaea orodata)*	Chemical: fluridone, 2,4-D liquid and granular, glyphosate.
Spatterdock *(Nuphar luteum)*	Chemical: glyphosate, fluridone, 2,4-D liquid and granular.
SUBMERSED PLANTS	
Coontail *(Ceratophyllum demersum)*	Biological: grass carp. Chemical: dichlobenil, diquat, endothall liquid and granular, fenac, simazine, fluridone, 2,4-D granular.
Hydrilla *(Hydrilla verticillata)*	Biological: grass carp. Chemical: copper, diquat, endothall liquid and granular, fluridone.
Bladderwort *(Utricularia species)*	Biological: grass carp. Chemical: diquat, 2,4-D granular, fluridone.
Southern naiad *(Najas guadalupensis)*	Biological: grass carp. Chemical: dichlobenil, diquat, endothall liquid and granular, fenac, simazine, fluridone, 2,4-D granular.
Fanwort *(Cabomba caroliniana)*	Biological: grass carp. Chemical: simazine, fluridone, 2,4-D granular.
Pondweed *(Patamegeton species)*	Biological: grass carp. Chemical: copper sulfate, dichlobenil, diquat, endothall liquid and granular, fenac, simazine, fluridone, 2,4-D granular.
GRASSES AND SEDGES	
Torpedograss *(Panicum repens)*	Biological: partial control with grass carp. Chemical: glyphosate, fluridone.
Maidencane *(Panicum hemitomon)*	Biological: partial control with grass carp. Chemical: glyphosate.
Paragrass *(Branchiaria purpurascens)*	Biological: partial control with grass carp. Chemical: glyphosate, fluridone, hexazinone.
Sedge *(Cyperus species)*	Chemical: partial control with glyphosate.
DITCHBANK BRUSH	
Wax myrtle *(Myrica cerifera)*	Chemical: partial control with glyphosate, 2,4-D + dicamba, hexazinone, tebuthiuron, imazapyr.
Willow *(Salix species)*	Chemical: 2,4-D glyphosate, 2,4-D + dicamba, hexazinone, tebuthiuron, imazapyr.
Brazilian pepper *(Schinus terebinthifolius)*	Chemical: glyphosate, 2,4-D 2,4-D + dicamba, tebuthiuron, imazapyr.
Water primrose *(Ludwigia species)*	Chemical: glyphosate, fluridone, 2,4-D granular, imazapyr.
ALGAE	
Macrophytic algae	Biological: grass carp. Chemical: copper, dichlobenil, endothall liquid and granular, simazine.
Filamentous algae	Biological; grass carp. Chemical: copper, diquat, endothall liquid, simazine.
Planktonic algae	Chemical: copper, simazine.

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Hydrilla can spread by plant fragments, underground stems, seed, leafbuds or buds on underground stems.

Cattail is an emersed plant which must be controlled by chemicals such as glysophate.

A VIRUS TO LIVE WITH

Research using a virus to biologically control a certain type of noxious blue-green algae has shown promising results, says an aquatic microbiologist with the Institute of Food and Agricultural Sciences (IFAS), at the University of Florida in Gainesville.

E. J. Phlips, Ph.D., a researcher in the Fisheries and Aquaculture Department, has isolated a virus effective in controlling one species of microcystus blue-green algae. He hopes to isolate a number of other viruses by the end of the year.

Phlips and his staff collect water samples from sewage systems, polluted lakes and waterways throughout the state searching for viruses which kill only blue-green algae. Phlips tests these viruses with the algae in his lab, since the two rarely exist together in the water.

Herbicides have been the most popular method for controlling aquatic fo-

continued on page 40

one that keeps weed pests restrained naturally. Many native plants have biological restraints that keep them from growing prolifically.

Years of research are required to ensure that the introduced organism does not become another dangerous pest. Most biological organisms will not eradicate the host plant, but will instead reduce the plant's potential to become a serious pest.

Insects and plant pathogens — Over the years, insects have proven to be the most popular biological control agents due to their high degree of host specificity.

The alligatorweed flea beetle *(Agasicles hygrophila)*, discovered in South America and introduced into the United States in 1964, is the best example of an extremely successful biocontrol program using insects.

The waterhyacinth has had several biocontrol agents to help reduce its prolific growth. However, unlike alligatorweed, these biocontrol agents don't appear capable of quickly controlling the plant. Two waterhyacinth weevils *(Neochetina eichhorniae, N. bruchi)*, the waterhyacinth mite *(Orthagalumna terebrantis)* and fungus *(Cercospora rodmanii)* can often be found associated with the plant.

Herbivorous fish — Numerous exotic fishes around the world are reported to consume aquatic vegetation.

Of the fishes examined to date, the grass carp appears to be the best candidate for aquatic plant control in a variety of situations and climates, and may provide the only practical control method for water bodies where herbicides cannot be used. This fish has provided excellent control of submersed plants, filamentous algae and small floating plants such as duckweeds.

The grass carp is used by Arkansas and other states for this purose in natural lakes and has been researched by a number of other states. Florida has conducted research and has approved the use of the triploid grass carp, which has three sets of chromosomes as opposed to the normal two sets and is thus sterile.

The three possible management strategies using grass carp:

1) complete vegetation removal within one to two years with a heavy stocking rate;

2) winter stocking, before the spring growth of weeds begins, using fewer fish to maintain a lesser amount of vegetation in the system and increasing the grass carp population as needed; and

3) integrated control using chemical treatments to obtain desired levels quickly and stock grass carp to maintain this level.

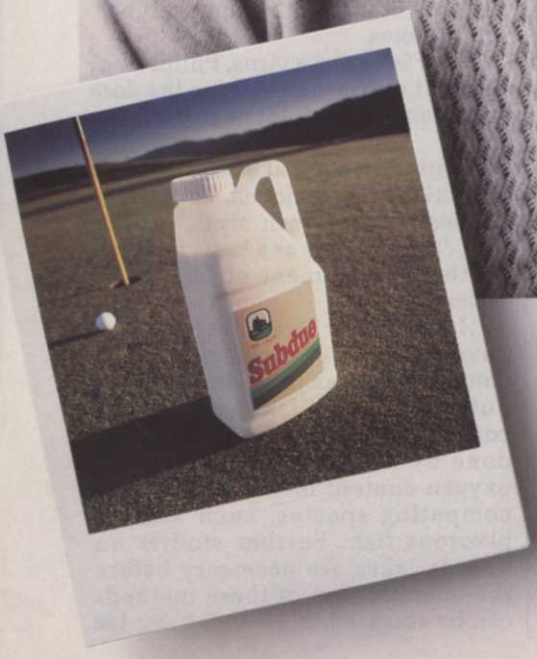
Chemical control

Controlling aquatic plants with herbicides is the most commonly used method of weed control. Chemical weed control has several advantages:

- Herbicides may be directly applied to undesirable vegetation, offering a high degree of selectivity and leaving desirable levels of vegetation.
- Pre-emergence application of appropriate herbicides can provide early weed control. This may be used to promote desirable vegetation without competition during critical early growth stages.
- Herbicides reduce the need for mechanical control which can increase turbidity and affect fish populations.
- Erosion may be reduced by promoting the lower growing grass species for cover.
- Many weeds, especially perennials, that cannot be effectively controlled by other methods are generally susceptible to herbicides.
- Routine use of herbicides under a maintenance program usually reduces the cost of weed control.

For chemical aquatic weed control agents, see the accompanying chart. **LM**

"One of my employees ran the mower into the lake. My wife totalled our new Volvo. And my daughter just dyed her hair purple. But what really concerns me is Pythium."



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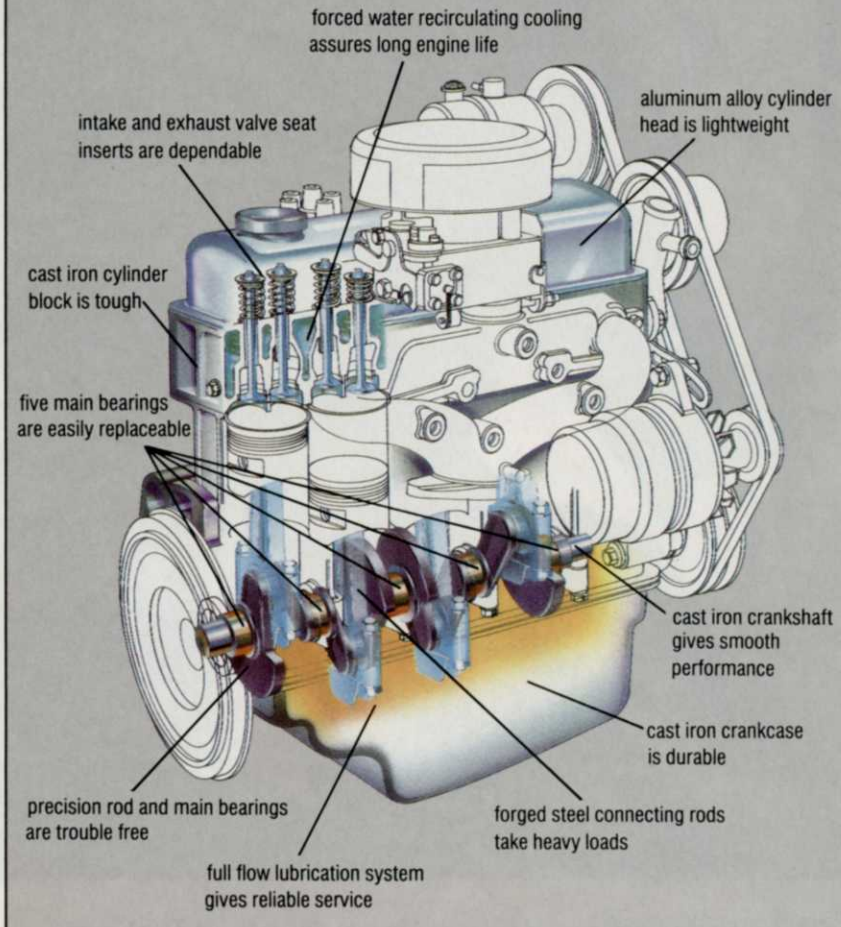
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A VIRUS TO LIVE WITH

from page 38

liage, but Phlips says, "Viruses are a more attractive alternative because they are specific to algae."

Phlips has conducted his research for the last six months with the help of a $20,000 grant from the U.S. Department of Agriculture, part of a larger grant for the Center for Aquatic Weed Control. Similar research has been conducted in the Great Lakes region and New England with promising results, Phlips adds.

His studies have been directed in part toward lyngbya, one type of blue-green algae found in Florida. "It forms a very dense, thick mat on the bottom of lakes, produces a bad odor and is reputed to produce toxic substances," Phlips said.

Algae breeding grounds are enhanced by sewage, runoff and industrial waste dumpage into lakes and canals. Light intensity, rainfall, temperature, carbon dioxide and oxygen levels also affect the algae. Phlips hopes viruses will biologically control the algae and replace or reduce the present use of herbicides and harvesting.

"A lot of blue-green algae are tolerant of herbicides, so a high concentration is used to achieve effective control," Phlips said. "Herbicides are also general in their action, so they kill off good blue-green algae with the bad," he said.

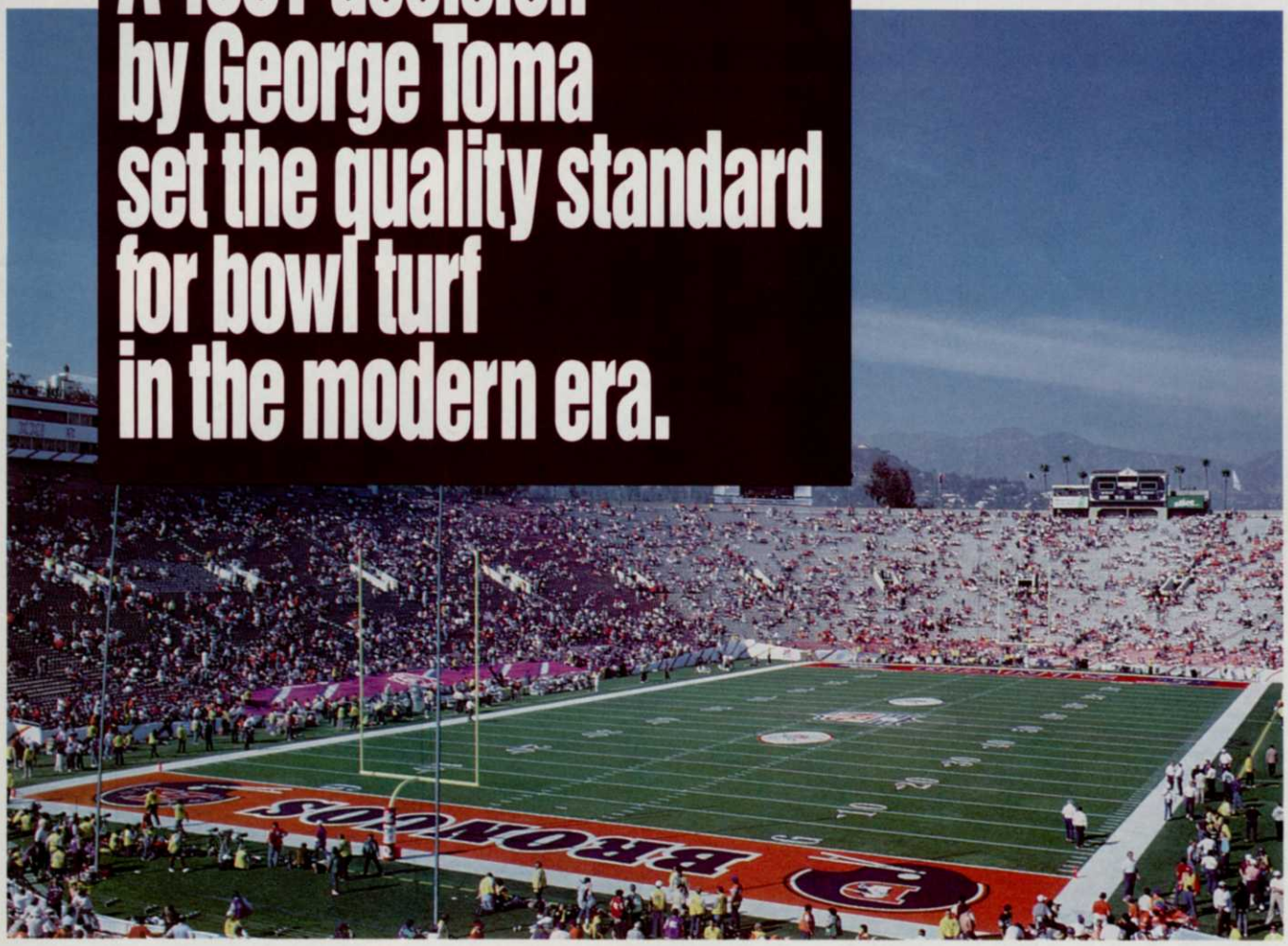
He has been examining existing viruses specific to certain harder-to-control blue-green algae. "It remains to be seen how many more we will find and how effective they will be," Phlips notes.

After isolating a virus, Phlips says, the next step is to determine the dose requirement and longevity of the virus.

"Our ultimate goal is to establish a collection of the major bloom-forming species of blue-green algae," Phlips says, "and use this as a basis for work on the development of biocontrol technologies."

He and other Center researchers have also been experimenting with controlling algae by controlling the nutrient input in lakes and also by controlling the lake environment, done by either adjusting the pH, oxygen content or the presence of competing species, such as herbivorous fish. Further studies on Florida lakes are necessary before the effectiveness of these methods can be assessed. **LM**

A 1981 decision by George Toma set the quality standard for bowl turf in the modern era.



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AN OLD MASTER

Harry Wilcox uses the knowledge of more than half-a-century in the turf business to help save teenaged knees and ankles in Pennsylvania. He works his magic like the old master he is.

by Jerry Roche, editor

Turf consultant Harry O. Wilcox has celebrated the ninetieth anniversary of his birth. He is hard of hearing and slow of foot. But a soil probe in his hands is like a sip from the Fountain of Youth.

One day not long ago, Wilcox spryly raised the trusty custom-made probe over his head and thrust it into a small bare spot on the varsity football practice field at Warren (Pa.) High School.

"Look at that," he told a handful of observers. "That's good, loose topsoil. I've been on fields where my probe bounces right off the ground."

Wilcox takes particular interest in Warren's practice field. The cultural practices used on the field are the same ones he suggested for Upper Merion (Pa.) High School more than 20 years ago.

John "Toby" Shea, then varsity football coach at Warren, read a June, 1965 article in *Athletic Journal*, entitled "Safer Athletic Fields." Its author was Harry O. Wilcox.

Wilcox moved to Warren in 1979 and met Shea one day in 1980, a copy of "Safer Athletic Fields" in his hand.

"I'm familiar with that article," noted Shea. "I'm glad to meet the author. We've been trying to follow the practices the article describes since I first read it."

Harry O. Wilcox (left), probe in hand, believes that soil compaction is the athletic field manager's biggest problem. He shares that observation with Arden Walter (center) and Toby Shea of Warren (Pa.) High School.

When Wilcox and county extension agent Bernie Wingert first inspected Warren's practice field (at Shea's request), they had few suggestions.

"Harry and Bernie recommended we put tile down because we had a bad drainage problem," remembers Shea. "So we tiled along a bank next to the field and along the outside of the track's straightaway on the other side. We now also have six-inch tiles along the inside of the entire track."

In 1980, Warren varsity football players suffered exactly two injuries during practices: both sprained ankles, both occurring on the cinder track during calisthenics.

Two years later, Wilcox again visited Shea (who is a practicing athletic trainer), and again asked him about injuries. The reply: "We had to tape a few ankles due to hardness of the field during dry weather when we couldn't water the field. But we had no injuries serious enough to cause any players to miss either practice or play."

The program

Warren is a small school district, and thus must manage fields using limited financial resources. Though varsity games are at the local municipal field which is mowed by city crews, Warren High employees must aerate, seed and fertilize that field. What money is saved goes toward improving three practice fields, especially the varsity field behind the high school.

Annual cost for materials used on the practice fields is $440. Here is what the cultural program looks like:

Early spring: Aerate fields to break up compaction. After the field

continued on page 49

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What aquatics experts have to say about new Sonar.

Terry Westergard

Owner
South Shore Fish Camp,
Lake Orange, Florida

"Sonar controls weeds longer than mechanical harvesting and I've seen no adverse effects from it. And the fishermen like the fact that they are able to fish in places where they haven't been able to get into for a number of years. They enjoy it because it reminds them of what the lake was like before the hydrilla.

"Fishermen want to go out without worrying about burning up their engines, and be able to throw in a lure and catch a fish. This is what we had 10 or 15 years ago."

Mike Mahler

Operations Coordinator
Polk County Environmental Services
(Florida)

"With Sonar, we were able to put the lakes back to the condition they were in before hydrilla came in. We've had some lakes that were virtually 100% surfaced out in hydrilla before we used Sonar. Now, it's rare to see hydrilla in those places.

"Sonar can be applied in the early spring or late winter, when our crews normally are idle. It's helped us catch the problem and knock it down before it becomes a problem.

"Most of our treatments ended up with more than 12 months of control. Contact herbicides give us about three months of control.

"On a per-acre, per-year-of-control basis, Sonar is cheaper than any other material."

Will Davis

Executive Director
Lake County
Water Authority (Florida)

"If I had to say there was one big advantage to Sonar, it's very selective on the plants it controls.

"Hydrilla is our main problem, and Sonar is our primary chemical for treating it. With Sonar, we got 99% control on Lake Yale without retreating...and we're seeing a good influx of native plants to take the place of the hydrilla.

"We're getting much longer term control, which means we're putting a lot less chemical in the water. Every year that you don't get a regrowth makes a big difference in costs over the long run. There was no cost-effective method of getting a lake clean until Sonar came along. I don't know of a chemical on the market that can even come close to it."

Paul Myers

President
Applied Aquatics,
Eagle Lake, Florida

"I was one of the fortunate few who was able to work with the product during its development stages. I was extremely excited about it because new aquatic herbicides are few and far between.

"With Sonar, we've gotten annual control with a single application in lakes and ponds. With contact herbicides, you can figure you're going to have to treat two to three times a year.

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MASTER *from page 44*

has been aerated, bare and thin areas should be overseeded with Scott's Sports Turf Seed. A seeding rate of 2 to 3 lbs. per 1,000 sq. ft. is recommended. Apply Scott's ProTurf High Density Starter Fertilizer to the entire field to stimulate early spring growth.

Spring: Apply ProTurf High Density Starter Fertilizer to improve root development and density.

Early summer: Apply Scott's Fertilizer Plus Dicot Weed Control to eliminate dandelions and 23 other broadleaf weeds while providing a full feeding of fertilizer.

Early fall: A couple of weeks prior to the opening of the season, apply Scott's ProTurf High Density Super Fairway Fertilizer, for thick dense turf with crowd-pleasing color.

Other practices

"Compaction is potentially our worst enemy," says Wilcox, a past president of the Pennsylvania Turfgrass Council. "If you're on a limited budget, the best thing to use your money for is aeration. At least two times a year—the more the better. I've never seen a field ruined by over-aerating."

Wilcox recommends using open-spoon tines because, he says, they penetrate into the soil up to five inches. Other kinds of tines only penetrate two to three inches, he believes.

Some turf managers put too much emphasis on applying seed, according to Wilcox. "Seed is important if you have large bare spots," he notes. "But it just doesn't pay to seed areas smaller than four or five inches across. If you aerify and fertilizer those spots, they'll heal by themselves."

ANY BARE SPOTS IN ATHLETIC FIELDS LARGER THAN THIS (4-5 INCHES IN DIAMETER) SHOULD NOT BE SEEDED, ACCORDING TO TURF CONSULTANT HARRY O. WILCOX.

Warren High School personnel applied 50 pounds of seed to the area inside the running track, which includes the practice field, this year.

Wilcox also believes that lime should be applied according to the type of grass in use. Bluegrass definitely needs periodic liming while turf-type tall fescue may not.

According to district maintenance supervisor Arden Walter, the fields are mowed at 3 inches during the summer and 2½ inches when football practice begins. "We don't believe in mowing too low," he says. "And the way we fertilize, we find that we've got to mow at least once a week."

Keeping the three fields playable—and safe—takes two people 30 hours per week, according to Walter.

Constant cooperation

One of the most critical requirements of good field management is cooperation from the coaching staff.

Wilcox says that coaches should try and spread out practices. He says that Northampton (Pa.) High School uses the areas beyond the end zones of its practice field so three groups of players can each use a field 60 yards long.

Shea, when he was at the controls of the Dragon football team, didn't waste opportunities to cooperate with others like Arden Walter and Norge Luvison, director of buildings and grounds. "Men like Toby Shea are doing a wonderful job," says Wilcox. "I've never seen a coach who cared so much about his players." **LM**

THE ONLY GAME IN TOWN

During the fall, the townspeople of Findlay, Ohio direct most of their attention at Donnell Stadium. So when the field tried to hide under mud, it was noticed.

By Jeff Sobul, assistant editor

The field was only two years old. But it had aged well beyond its years. Eleven Findlay High School and Findlay College football games each year, numerous soccer games and other events, coupled with wet weather and poor drainage, had taken their toll. By the end of the second football season, in November, 1985, the Donnell Stadium field was unplayable.

In fact, an NAIA Division II playoff game between Findlay College and St. Ambrose, Iowa, had to be played at nearby Bowling Green State University.

Something obviously had to be done.

And something was done. In addition to building a separate field for soccer to distribute field use, the Donnell field was replaced again, this time with a Prescription Athletic Turf (PAT) System perfected and patented by Purdue University professor Bill Daniel, Ph.D.

Artificial turf was considered. "It was either put in a PAT system or a similar system or go to artificial turf, which I won't do," says Jack Volkmer, business manager for Findlay Schools. "It's a horrible thing to make people compete on an artificial surface."

A little help

Now, boasts Volkmer, "Donnell is probably one of the nicest high school facilities around." The installation cost slightly less than

$250,000, no small change for anyone, including a small town.

All stadium maintenance is funded by the Donnell Foundation, Volkmer says. "The money doesn't come from tax money. Otherwise, we wouldn't have been able to afford to do this." The Donnell Foundation is a fund set up by the Donnell family, former owners and operators of Marathon Oil, a primary employer in the small, industrial western Ohio town.

This major undertaking began in December of 1985. Daniel, Laurel Meade and David Heiss, who are marketers of the system, all came out to survey the field after Volkmer contacted them. (They were also in attendance for the first game on the new field.)

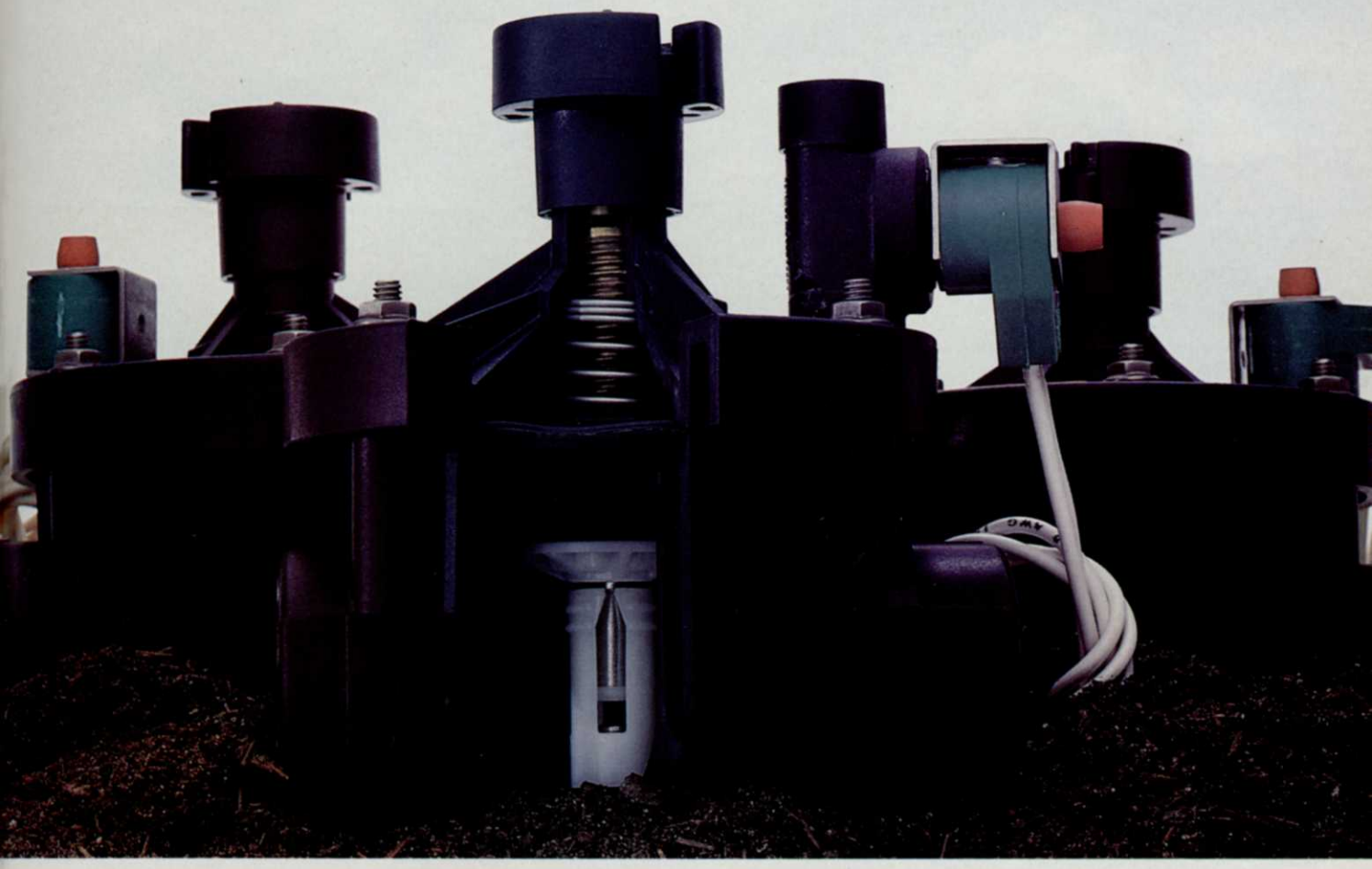
Excavation began in December and continued through the winter, with problems other than some occasional bad weather hampering construction. "We had some real terrain problems," Volkmer notes. "That's built on solid rock. That's a

continued on page 54

At the end of the season, after 11 games, two played in downpours, there were no visible signs of heavy wear down the middle of the field.

In one off-season, the Donnell Stadium field went from a mud hole to a near perfect playing surface when the season opened in September, 1986, after the PAT System was installed.

When it's a dirty job, but someone's got to do it...



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GAME *from page 50*

quarry out there," he says of the ground the field is built on.

The headaches didn't stop there. "The field when it was originally built in 1927 had an 18 inch drop-off, which nobody really knew," he explains. "When you look at the track you can see we had to move the field because it needed to be perfectly flat. One end is down and the other end is up."

Laying it down

The PAT system is constructed with a flat subgrade and plastic barrier under a system of perforated pipes. The pipes set below a special mixture of sand, peat and nutrients. Pumps connected to the pipe system can draw off excess surface water in minutes.

When weather cleared in the spring of 1986, the PAT people began installing the system. "We have our graduation out there (on the field)," Volkmer recalls. "By graduation, they had just put in all the sand.

"If you can imagine everybody sitting in the stadium; I mean everybody looked at me like 'what did they do to the football field?' If they could have had my ass, they would have had it. Everybody goes to the games. We've got 5,000 to 8,000 for every football game. It's like the only game in town."

Volkmer adds the pumps are only used in heavy downpours on or near game days. This occured twice during the 1986 season. "The first game we had just a huge rainstorm. Huge. We had to hold up the game until 8:30."

"You couldn't see from one end of the field to the other," adds field maintenance manager Chuck Andrus. His job has been relatively easy. The PAT system worked so well, the field looked as good last November, after 11 football games, as it did before the season started.

"The footing was never bad (during the first game)," Volkmer notes. "That's the key thing: the footing and the safety of the ball players."

And that's no small change either. **LM**

RESOURCEFUL RENOVATION

Even when budgets are low, school systems can renovate athletic fields. Here's how a Philadelphia area school system tackled the job.

by Heide Aungst, managing editor

Bare spots speckle the field. Stressed turf clumps fight to hang onto life. Twelve gym classes, a soccer league and a junior high football team trample and tear up what's left. A kid cries after a fall on the rock-hard surface.The field cries for renovation. The field manager cries for more money. The school board cries for the lack of money.

Everybody loses.

Money may be hard to come by for some school systems, but excuses are abundant. Field managers jump at the "we-can'ts" before fully exploring the "how-tos."

Every industry has tricks of the trade and corners to cut. It's possible in athletic field management, too. Just ask the Springfield, Pa. County School District. They've used almost every trick in the book, and some they dreamed up themselves, to renovate dwindling fields on a dwindling budget.

"About 35 percent of the ground on one field was bare," says Bruce Thomas, maintenance supervisor for the Philadelphia area school district. "The school was complaining about the bare ground and the field was lower."

Bruce Thomas, Andy McNitt and Bob Scanzaroli look at the deep root system of the turf on the newly renovated E.T. Richardson field.

Personnel

Thomas took the first step by hiring Bob Scanzaroli as grounds manager in mid-August. The school system couldn't afford to create such a position, but when the grounds manager left for another job, Thomas made sure the replacement had the necessary turf knowledge. Scanzaroli is an '84 graduate of Penn State University.

Together Thomas and Scanzaroli consulted with the Philadelphia County extension agent, Andy

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McNitt. States differ on their approach to extension agents. In western Pennsylvania, McNitt explains, agents sometimes cross county lines depending on their specialty.

Besides seeking McNitt's advice, Thomas looked at other fields in the area that had been renovated. He consulted with managers at local Swarthmore College, where he could see results.

Equipment

The next step was to take an inventory of the equipment the school system already had, and that which would be needed. The pair resurrected a more than 20-year-old reel mower from the grave. They got the cooperation of the local parks and golf course in sharpening the reels for free.

They did decide to replace a 30-year-old tractor with a new 40 hp version. "It was a $25,000 expenditure from the replacement equipment budget," says Thomas. "Some school districts choose to lease them. We feel it's worth our while to purchase it. In the winter we use it to push snow."

They bought a new rotovater. The two new purchases have since been lent free of charge to other "poor" school districts which can't afford to purchase their own equipment.

Materials

The third step was to decide which fields should be renovated and what seed and other materials would be used to do it. Thomas chose two fields to start with. A third, the varsity football field, is currently undergoing similar renovation.

The first field they chose to renovate was at E.T. Richardson Junior High School. The field is used by soccer teams, lacross, softball and gym classes. The field isn't irrigated.

"We chose rye because it enabled us to put the field in use by spring," Thomas says.

The key to the field renovations is an organic material called Earthlife. The material is made from the city of Philedelphia's sewage sludge, similar to Milorganite. The difference is that Earthlife is mixed with wood chips.

Scanzaroli renovated the field—practically by himself in five days. "That was as early as we could get the field," Thomas says. "We also got a lot of support from the school district and community.

When goal areas wear away, field renovation is necessary.

"The first day and a half, I aerated the field more than 20 times," Scanzaroli explains. He aerated with a Westpoint aerater then dragged the field to break up the cores.

By the third day, he dumped five trailers (250 yards) of Earthlife on the field and dragged it. The next day Scanzaroli aerated and fertilized. "That allows the material to drop into the holes," he explains.

The final step was to fill in the holes with Champion perennial ryegrass mix of 49 percent SR4100, 24½ percent SR 4000 and 24½ percent Tara. They did this using a Jacobsen verticut seeder.

The entire project cost only $4,300: $2,900 for Earthlife; $450 for seed; $300 for fertilizer; and $650 for labor.

Multipurpose field

The next field, Halderman, is a multipurpose field used for varsity soccer, varsity lacross and community softball.

Because of the intense use, the school district decided to spend more money on the renovation to provide a good sand base. "But it won't need to be renovated again for 10 or 12 years," says Thomas.

"Sand cuts down on compaction, but the particles have to be uniform or it will compact more," McNitt says. "You have to use more than 50 percent sand or it will turn into cement.

"Because it's an all-weather playing field the sand aids in drainage," adds Thomas.

During the renovation of this field, Scanzaroli rotovated the field three times. Then brought in the Earthlife and sand and rotovated again another three times. Then Scanzaroli graded the field and seeded with a special Springfield mix. The mix included Adelphi, Merit, Eclipse and Glade Kentucky bluegrass and Premier, Jazz and Fiesta perennial rye.

The field used 500 cubic yards of one millimeter sand at $13,000; 300 lbs. of Earthlife at $2,300 and $690 of Springfield seed mix.

Scanzaroli and two other workers maintain a total of 83 acres of athletic fields on an annual budget of $22,000. They plan more low budget renovations in the future.

After all, they'll admit, where there's a will, there's a way. **LM**

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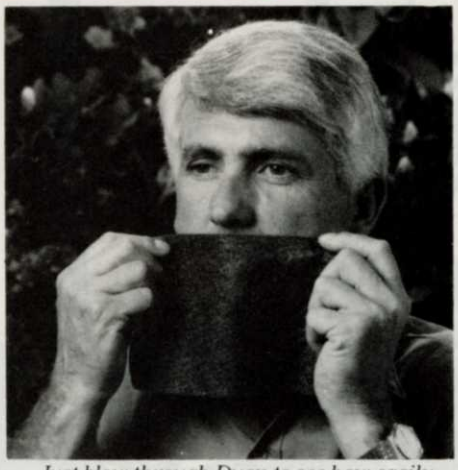

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TRACKING TRACTORS

Selecting the appropriate tractor is an important purchasing decision for a landscape manager. Here are some things to look for before making the big purchase.

The guidelines to follow when choosing a tractor and associated attachments are as varied as the tasks for which they are used and, therefore, require careful consideration.

"It's important to determine the work that has to be done prior to purchasing a new piece of equipment," says Roger Strome, JI Case product supervisor for under-30 hp tractors. "Whether you're landscaping an office complex or mowing grass on a golf course, matching the tractor to the job will improve efficiency."

A number of criteria are involved in the buying decision, including horsepower requirements, tire selection, three-point hitch, power take-off (PTO) options and maintenance needs. All considerations should be assessed based on required performance by evaluating the type and variety of tasks and the size of machine needed to properly perform them.

Horsepower

Horsepower requirements depend upon the size and scope of the job and the amount of lifting, pushing and pulling to be performed. Tractors ranging from 15 to 30 hp will handle most mowing, scraping and loading chores.

For more rigorous work, however, a tractor from 35 to 75 hp may be a better choice. Some machines are specifically designed for heavier loading and scraping.

Tire tips

Tire selection is another key consideration. Turf tires are usually desirable for mowing grass and other landscaping. Bar or lug-type tires are also suitable for many landscaping, utility and agricultural applications. Just as tires should match the application, the three-point hitch and PTO should correspond to the job and the attachments being used.

Front, rear and mid-mounted mowers, blades, loaders, snow throwers and other equipment have different requirements that should be considered during the buying process. Maintenance and safety features are also important, particularly when several employees are working with the machine.

Comfort, convenience and ease of service will increase efficiency of both the tractor and operator. Adding features that enhance performance and expand a tractor's versatility should also be considered during the purchasing process.

"An option that's becoming more popular on smaller tractors is mechanical front wheel drive," Strome says. "This provides extra traction by supplying power to the front wheels as well as the rear, which reduces slippage in wet conditions, in loose soil and on slopes. The result is improved productivity and a unit that can easily handle a wide variety of tasks."

Weighing realistic expectations according to a tractor's capabilities will help insure that the selected unit provides optimum performance and satisfaction. **LM**

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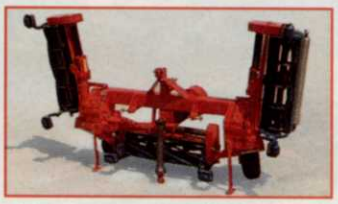

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On Design

MAKING A SPLASH

by Heide Aungst, *managing editor*

The Hyatt Regency-Scottsdale doesn't have a swimming pool. A ½-acre "water extravaganza" is more like it. Landscape architects SWA Group of Sausalito, Calif. worked closely with hotel architects Howard Fields and Associates of Sausalito and Hornberger, Worstell and Associates of San Francisco in designing the $3.8 million water playground in the middle of Arizona's desert. Date palms averaging 30 feet in height surround the pool area, adding a touch of green to the blue oasis. More than 300 date palms can be found on the hotel's eight landscaped acres. Turf under the palms is a combination of bluegrass, fescue and rye. The boxes next to the pool hold California pepper trees. While guests take a dip, they can watch others playing golf at the 27-hole Gainey Ranch Golf Club. Bill Callaway, principal of SWA Group, says drainage is the biggest consideration in planting around pool areas. "Chlorine kills the plants if it gets on them," Callaway says. "You have to put drains in the deck area to take the water away." The hotel was completed in December 1986.

The Peridian Group landscape architects took two different approaches to the pools at the Ritz Carlton, Laguna Niguel, Calif. Towering Mexican fan and queen palms highlight the South pool area. Various annuals, such as blue salvia or snapdragons, are rotated to provide accents of color under the palms. Pool paving includes scored, colored concrete in a large pattern to complement the size of the pool area. The architects also installed Grasscrete paving to provide fire access around the pool.

Peridian designed the North pool area (inset) as a tree canopied garden using rusty leaf figs (ficus rubiginosa), California sycamores, podocarpus gracilior and tabebuia. Turf is a Marathon sod of various fescues. Flowers include impatiens and bedding begonias. The unique irregular shaped pool paving was quarried in Mexico. Peridian Group completed the project in summer 1984.

Preserving the wooded atmosphere of this home in Oyster Bay, N.Y. was the goal of designer/installer Alley Pond Nurseries Huntington, Inc. of Dix Hills, N.Y. The firm built the pool deck around existing trees, including redbuds, weeping hemlock and birch. They accomplished this by changing the grade at one end of the pool to accommodate a low retaining wall of ties supporting the deck. The design won a 1986 National Landscape Association's "Superior Award." Judges cited the different levels created by the steps as an important design element adding interest to the deck. The waterfall in the pool allows homeowners to hear water at all times.

The owners of this Fort Lauderdale, Fla. residence and pool removed all plant materials during extensive home renovations. Landscape architect J. Roland Lieber of Naples, Fla. and installers Friends Landscape Inc. of Fort Lauderdale created an illusion of privacy with plant materials. They did this by designing planter areas and raised planter boxes around and in the pool. In the boxes they planted Alexander palms, bougainveillea, self-heading philodendron, liriope, asparagus fern and carissa. Lieber won a 1986 National Landscape Association "Superior Award" for successfully restoring the property's lush vegetation.

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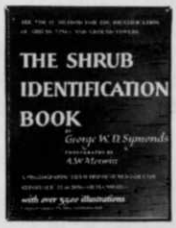

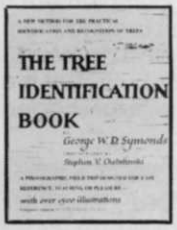

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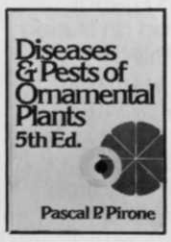

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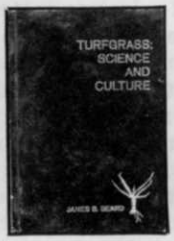

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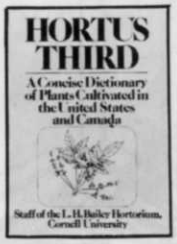
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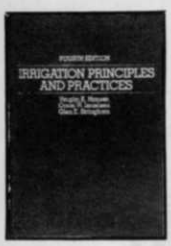

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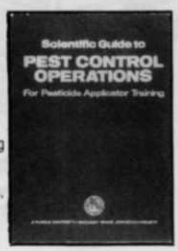

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LM

PURCHASING

...for price, performance and profitability.

by Rudd McGary and Ed Wandke

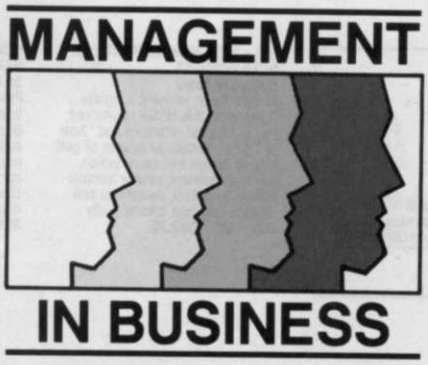
Inventory control and product purchasing are not issues limited to only large companies. Today, multiple reasons exist for green industry firms to take more time making product selections.

Issues that need to be addressed are:

- legal reporting requirements for material usage,
- determination that products were applied in accordance with the label rates for the product, and
- cost impact of excessive materials usage in reducing a firm's profitability.

The process of selecting materials for the coming year should not be limited to price consideration. Today, turf professionals must make decisions about the most cost-effective products for the properties they maintain. Other considerations are the constant development of new products and the multiple formulations available.

The problems confronting a turf manager cover three basic areas. First: how to determinine the true cost of products used; second: how to determine the effectiveness and selection of products to be used; and third: why



there is a need for variable agronomic programs for the turf being serviced.

Material costs

In analyzing the total cost of using various products to control turf problems, a system needs to provide information to the management on a daily basis. This data should be capable of fulfilling the many regulatory, accounting and operational functions needed to manage a business. A typical system should contain the following:

1. Total turf area treated by day by an employee.

2. Total product usage for the day.

3. Projection of product usage based on the agronomic program the employees are supposed to be applying.

4. Comparative analyses of the actual product used per day vs. the agronomic program for the day vs. the area treated for the day.

5. Comparison of product usage with labels for over or under application.

6. Service calls run for the day by employee.

7. Service call product usage by area treated.

8. Reconciliation of product usage with the physical inventory.

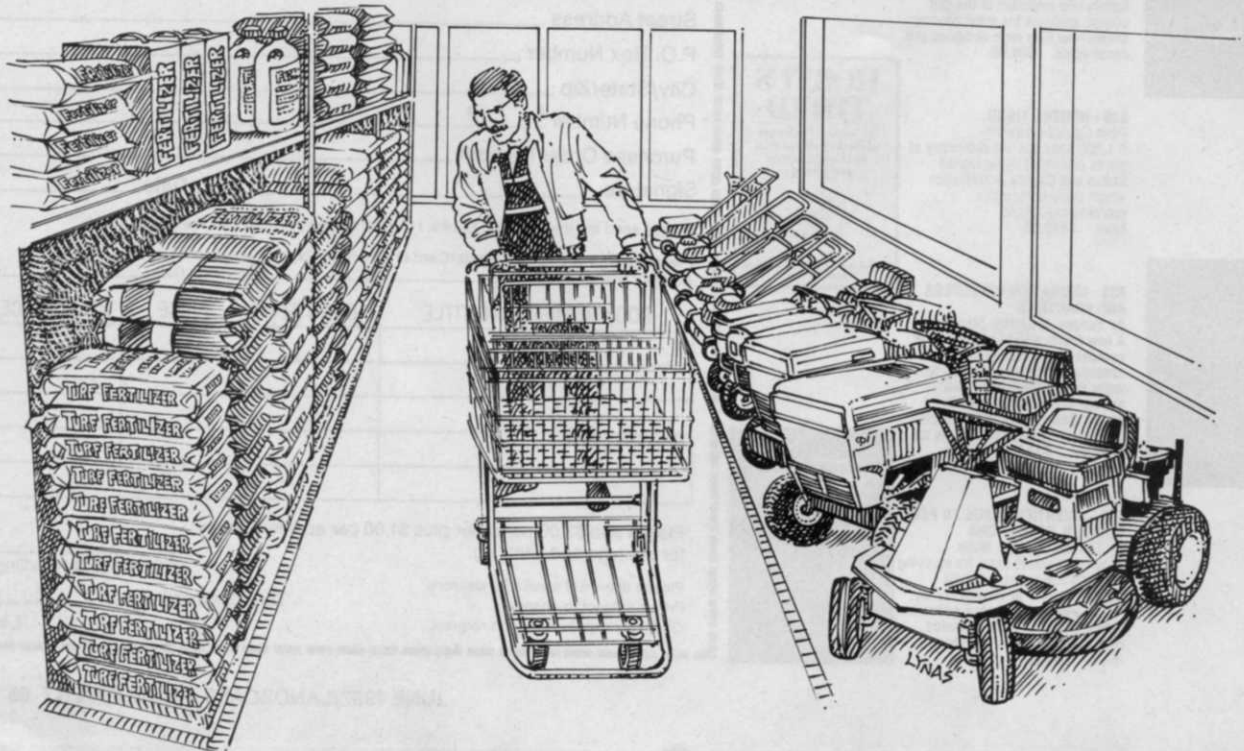
9. Monthly summary of the daily data and its transfer into the accounting permanent records.

This system, though designed to account for product usage, also provides management with an insight into many other areas of the company's performance.

Employee performance has a definite impact on profit. Here are the areas that should be considered:

1. Total area treated for the day: was the work performed too quickly resulting in increased service calls in the future?

2. Product usage for the day: was the product applied at a rate under the



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Always follow label directions carefully when using turf chemicals.

Circle No. 116 on Reader Inquiry Card

label which resulted in less than desired control, or in a case of overuse, is liability a potential issue and is excessive use resulting in higher costs?

3. Product application at other than the programmed rate: does the employee need additional training to learn how to apply materials in accordance with program levels?

4. Inventory usage for the day, compare actual to physical: many issues. Are products being stolen? Are additional areas being serviced that are not going through the accounting records? Do long-term trends by all workers indicate a potential fill chart problem (if liquid) or miscalibration of spreaders (if dry)?

This calculation of material use is not the only cost needed to determine your material cost of operations. The costs of under-use and the additional resultant service calls also need to be accounted for. Since service calls require additional visits to a customer's property, the following additional costs need to be determined.

1. Direct labor to perform the service call (direct labor, fringe and supervision).

2. Vehicle costs (fuel, oil, maintenance, insurance, etc.).

3. Administrative costs to trail service call and to handle customer communications, etc.

4. Supplemental material costs not used in basic turf program (fungicides, pesticides and herbicides not applied on a broadcast basis).

To calculate non-material cost for service calls, use the following formula:

Labor	35%
Vehicle	12%
Administrative	18%
Other direct	4%
Total	69%

Most firms in the green industries can convert the above percentages into dollars by knowing the total revenue you will earn for the fiscal year. For example, if expected annual revenues are $900,000, total cost based on the above 69 percent equals $621,000. If 4,300 customers receive five services during a year, the employees will make 21,500 stops. Based on the services call data revealed to the PLCAA in its annual surveys in 1985 and 1986, recalls or service calls are approximately 10 percent of all calls. Total stops for service delivery would be 23,650 (21,500 plus 2,150). The total cost for each stop would be calculated by dividing $621,000 by 23,650—$26.25.

Thus we see that non-material costs amount to approximately $26 per stop, whether it be to deliver the basic program or perform a service call. Based on the results of firms in the green industries over the past three years, costs have increased to between $30 and $40 for all costs of a service call. Do you know what your service call costs are?

Product comparison

With the constant reformulations of turf products and the development of many new products due to environmental pressures or employee health concerns, it is important that companies keep current in technical awareness. If the time doesn't exist to stay current technically, don't rely on product sales personnel. Here are some information sources to increase your technical knowledge.

1. Turf extension agent in your market.

2. Fellow turf professionals in your area.

3. PLCAA technical director.

4. Competitive product suppliers.

5. University research on grass species you treat.

6. Publications such as LANDSCAPE MANAGEMENT, *Lawn Care Industry*, *Grounds Maintenance*, *Lawn Servicing* and *American Lawn Applicator*, to name but a few.

But this public body of information should be balanced with the results of the agronomic program you followed last year. Often a firm doesn't change its program enough each year even when it didn't work the year before.

The aggressive and often more profitable firms evaluate their turf results each year, conducting a survey to determine customer satisfaction with the turf density and color. Remember to take into consideration the cost of service calls. Often service calls may be the result of product ineffectiveness or non-performance even when applied to the turf at the label rates.

Wandtke and McGary are senior consultants with All-Green Management Associates in Columbus, Ohio. Dr. McGary focuses on marketing and management issues. Wandtke focuses on operations and financial questions.

Agronomic programming

Not all lawns need the same agronomic program to reach their peak condition every year. Over-selling customer expectation and then not being able to deliver the promised results is one of the principal reasons for cancellations in the lawn care industry today. Do all lawns need the same agronomic program? Shouldn't programs be changed during the year based on local conditions?

If you have answered yes to either of these questions, do you run different programs in your market for customers who have different turf problems?

Most agressive lawn care firms—whether liquid or dry—deliver different agronomic programs to their customers in a round depending on the turf requirements. The benefit of this is often either reduced product costs or increased customer satisfaction due to the custom applications. Problems include more complicated routing if you are a liquid firm or potential employee mistakes in product application if your services use dry products.

Based on more than 15 years of experience in developing agronomic programs for the turf industry, Bob Robinson, an All-Green senior consultant, recommends the development of various cost-level programs to be used depending on the years of professional turf service a property has been served. Experience has shown that the additional time to vary the program for older customers often results in more turf density, less weed pressure and increased customer satisfaction because of the turf's durability. The turf professional must make a commitment to maintain an ongoing relationship with each customer, so the program must balance root growth and leaf blade color.

Summary

Selection of products should not be taken lightly. Analyze the results of your current program. Evaluate the service calls required during the past year and weigh the issue of increased product cost with a related reduction in service calls.

Finally, make sure your inventory system meets the regulatory reporting, usage documentation, and the management information data to assist in better managing a more profitable business. If, through improved product selection, a firm can cut its operating costs only two percent, often this amounts to a before-tax profit increase of 15 to 20 percent.

LM

Introducing Warren's® WEED ARREST™ MULCH UNDERLINER

There are 5 important reasons new Warren's WEED ARREST mulch underliner is the best premium weed control fabric you can use:

WEED ARREST does a better job and lasts longer . . . because it's 100% premium *polyester* (not polypropylene), it resists the sun and the soil environment and harsh chemicals far better. The mulch areas on your jobs will stay cleaner years longer than your competitors' who make do with polypropylene fabrics or inferior plastic products.

WEED ARREST is easier to handle and install . . . because of its 100% needlepunch bonding, it's extra strong yet soft and flexible so you can install it faster. It also conforms and sticks to landscaped contours better than old-fashioned heat-bonded fabrics that are stiff and hard-to-handle.

WEED ARREST helps keep mulch in place . . . because of its high coefficient of friction, bark, wood chips and other mulches stick to it better. So it does a lot better job combating mulch erosion on tough grades.

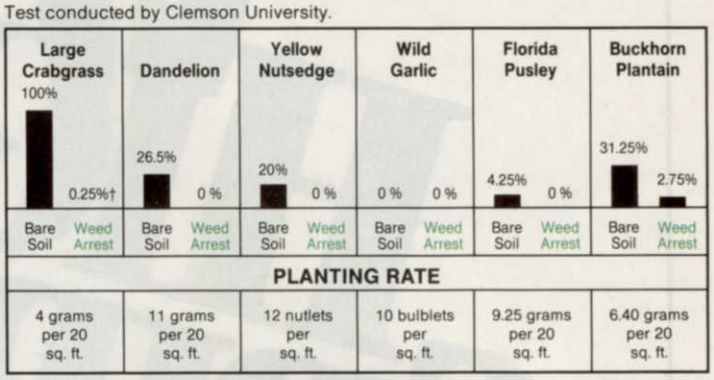
WEED ARREST lets water pass thru FAST! . . . because it's needlepunch bonded (not high-temperature bonded between high-pressure rolls), water, fertilizer and air pass through it easily so soil and plants stay healthier!

WEED ARREST saves you money on every job . . . because it's easier to install, conforms to terrain better, holds mulch better, does a far better job controlling weeds and lasts years longer, your jobs go in faster and hold their beauty . . . *plus* you'll continue to save time and money because you'll have fewer callbacks and less costly rework with Warren's new WEED ARREST mulch underliner.

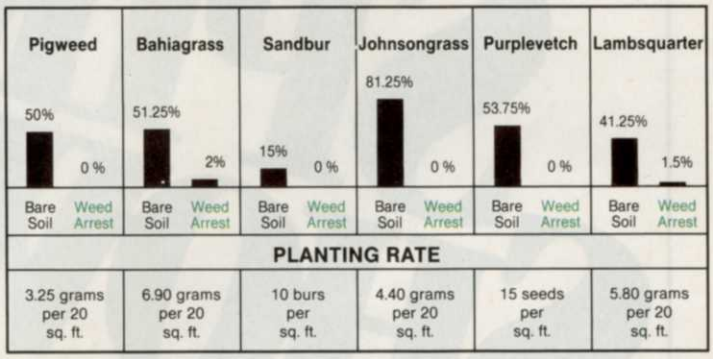
University tests prove it does a better job controlling 12 of the toughest weeds in the business.

It's also the only *100% polyester** weed control fabric that meets the tough standards of today's turf professionals.

Test conducted by Clemson University.



Percents refer to the percentage of area covered by weeds. †0.25% means 1/4 of 1%



Before you buy any weed control fabric, compare it with Warren's new WEED ARREST mulch underliner.

Ask your Warren's Turf Professional for your FREE WEED ARREST sample or call the TOLL FREE number listed below.

WEED ARREST mulch underliner is now available from Warren's distributors throughout the U.S. Call us for the name of the stocking dealer nearest you. Call 1-800-828-TURF (8873) In California call: 1-800-828-8882.

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For specific product information contact: Warren's Seed & Special Products Division, P.O. Box 459, Suisun City, CA 94585

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HIGH SPIRITED SHOWS.

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WTT

RESEARCH UPDATE

More research on athletic fields

John R. Hall III, Ph.D., Virginia Tech

Many excellent research papers on turfgrass management were presented at the meetings of the American Society of Agronomy held in New Orleans in December, 1986. Some of these research papers have particular relevance to athletic field management and may assist professionals in making decisions.

A.D. Brede, formerly of Oklahoma State University, discussed his work evaluating cultural methods of reducing Bermudagrass encroachment into tall fescue turf. Surprisingly, there was no difference in encroachment of the Bermudagrass into K-31 and Mustang tall fescue. One would have thought that the more dense Mustang would have slowed Bermuda advancement. In general the Bermudagrass was most invasive under lower mowing heights, higher nitrogen levels, lower tall fescue seeding rates and in spring seeding situations.

PRACTICUM: Maintain tall fescue athletic fields with moderate levels of nitrogen (3 to 4 lbs. N/1000 sq. ft./year), reasonable mowing heights (1.5 to 2.5 inches), fall fertilization, which does not favor the Bermudagrass, and when repairing areas utilize adequate seeding rates (4 to 6 lbs/1000 sq. ft.).

P.H. Dernoeden of the University of Maryland presented a literature review on the effect of herbicides on turfgrass rooting. In Kentucky bluegrass the severity of root inhibition among the most commonly used preemergence herbicides at normal use was generally: bensulide>benefin>oxadiazon>DCPA>siduron.

He noted that on Bermudagrass, siduron, napropamide, prosulfalin, metribuzin and bensulide have been reported to inhibit rooting. Root inhibition on both Kentucky bluegrass and Bermudagrass has been reported within four weeks of 2,4-D or dicamba use.

Z.J. Reicher and N.E. Christians of Iowa State University looked at preemergence herbicide-induced rooting inhibition as it was affected by maintenance level and noted that pendimethalin produced root inhibition on Kentucky bluegrass at normal use rates under low maintenance, but did not produce a significant negative effect under high maintenance.

PRACTICUM: When using herbicides be aware of the possible negative effects associated with their use and if possible alter management to minimize the stress. Irrigation, higher mowing heights, proper mowing frequencies, adequate aeration and proper nitrogen timing and amounts to enhance root growth can all minimize the negative effect of any herbicide-induced root inhibition.

R.S. Sowers and M.S. Welterlen of the University of Maryland reported on the use of clear polyethylene covers to enhance the sprig establishment of Midiron and Tufcote Bermudagrass. Early summer sprig establishment success was reduced with the use of tarps because of excessive heat buildup. Late season spriggings made in August, September and October with clear plastic tarp cover, established quicker, went into dormancy later and showed increased winter survival.

August and September spriggings kept under the tarp for the entire winter provided 100 percent ground cover by July 1. October spriggings tarped for winter showed poor establishment cover on the following July 1.

PRACTICUM: Use of tarps to enhance late season Bermudagrass sprig establishment can be beneficial, however there are limits to the ability of the tarp to produce 100 percent winter survival. Avoid use of tarps under mid-summer conditions unless you can monitor them closely and avoid excessive heat buildup.

Additional management factors that will enhance establishment rate and winter survival include balanced nitrogen and potassium nutrition (2.0 to 2.5 lbs. of nitrogen and potassium/1000 sq. ft. disc into the sprig bed). High mowing heights late in the season will help retain soil heat and insulate crown tissue. Adequate irrigation will promote rapid growth. Additional potassium applications late in the growing season will likely improve winter survival of the less winter hardy Bermudagrass cultivars.

R.L. Henderson and D.V. Waddington reported on their attempts to measure impact absorption on athletic field soils. Impact absorption was measured by quantitating the peak decelerations imparted to a falling object when dropped on various grassed and ungrassed surfaces.

Grassed clay soils had 21 percent higher peak decelerations ("hardness") than grassed sand soils. When these same soils were bare, the peak deceleration rates increased 21 percent on the clay soil and 100 percent on the sand soil. Core aerification of a bare surface reduced peak decelerations 33 percent.

PRACTICUM: Reduce potential athletic field-related injuries by maintaining a good dense turf cover. Utilize core aerification on athletic fields as often as growth rates, soil moisture and air temperature conditions are adequate to minimize the time the field surface is disrupted by the cultivation. **LM**

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Poast delivers consistent, gentle control of your toughest grasses. Like bermudagrass and crabgrass, quackgrass and foxtails. And in your most valuable greenery. Like flowers, shrubs, trees and ground covers.

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Best of all, Poast saves you all the time, labor and expense of handhoeing.

So this year, let Poast take care of the grasses. So you can take care of the rest.

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Turf disease diagnosis on the course

For fans of the old Bullwinkle cartoon shows, this is a familiar scenario:

Bullwinkle (in magician's outfit): "Hey Rocky, watch me pull a rabbit out of m'hat."

Rocky: "Again?"

Bullwinkle: "Nuthin' up my sleeve and...presto!"

And out of the hat comes an angry lion, tiger, rhinocerous, etc.

For a long time, turfgrass managers have used similar tactics trying to diagnose turf diseases, often with similar unpleasant results. And it took a lot longer. Fortunately, a solution could be at hand.

Agri-Diagnostics Associates of Cinnaminson, N.J. has introduced, via limited distribution, a disease detection kit that is both accurate and fast.

The kit, which involves a series of 12 steps (see diagram), is designed to detect turf diseases before visible symptoms appear. In doing so, it makes a preventive spraying program more effective. The kits identify pythium blight, brown patch and dollar spot.

How it works

The diagnosis process, which takes roughly 3½ hours, works by matching antibodies in an assay on the end of a dipstick with a specific plant pathogen. A positive reaction creates a deposit of insoluble colored product on the end of the dipstick.

By comparing the intensity of the color on the dipstick to known standards, a diagnosis of the extent of the disease can be made. The color's intensity is measured in a field-adaptable reflectometer, the disease detection meter included when kits are ordered. The higher the number displayed by the reflectometer, the more pathogen present.

Ohio State University turf pathologist Bill Shane has tested the pythium kit at four sites: three at the university's Scarlett and Gray golf courses; one at a test plot. "It seems to be accurate in that if a sample has pythium the kit will pick it up," Shane comments. "In no case did I feel pythium was in the sample at a significant level that the Agri-Diagnostics kit couldn't pick it up.

"It's good to use as an informative tool to verify what (the superintendent) believes is pythium," he says. "It does provide that extra bit of knowledge they need to feel good about their spray program."

University of Minnesota plant pathologist Philip Larsen has also been testing the pythium detection kit in his lab. He has found that perhaps the best time to use it is when the first visual symptoms of a fungus appear, before they are distinctive enough for a specific identification. "You can't tell the difference in the early stages, but the kit can," he notes. He adds that the kit is a good monitoring tool to see if and when further applications of fungicide should be made.

"A more subtle use would be to be able to detect the presence of fungus before visual symptoms appear," Larsen says.

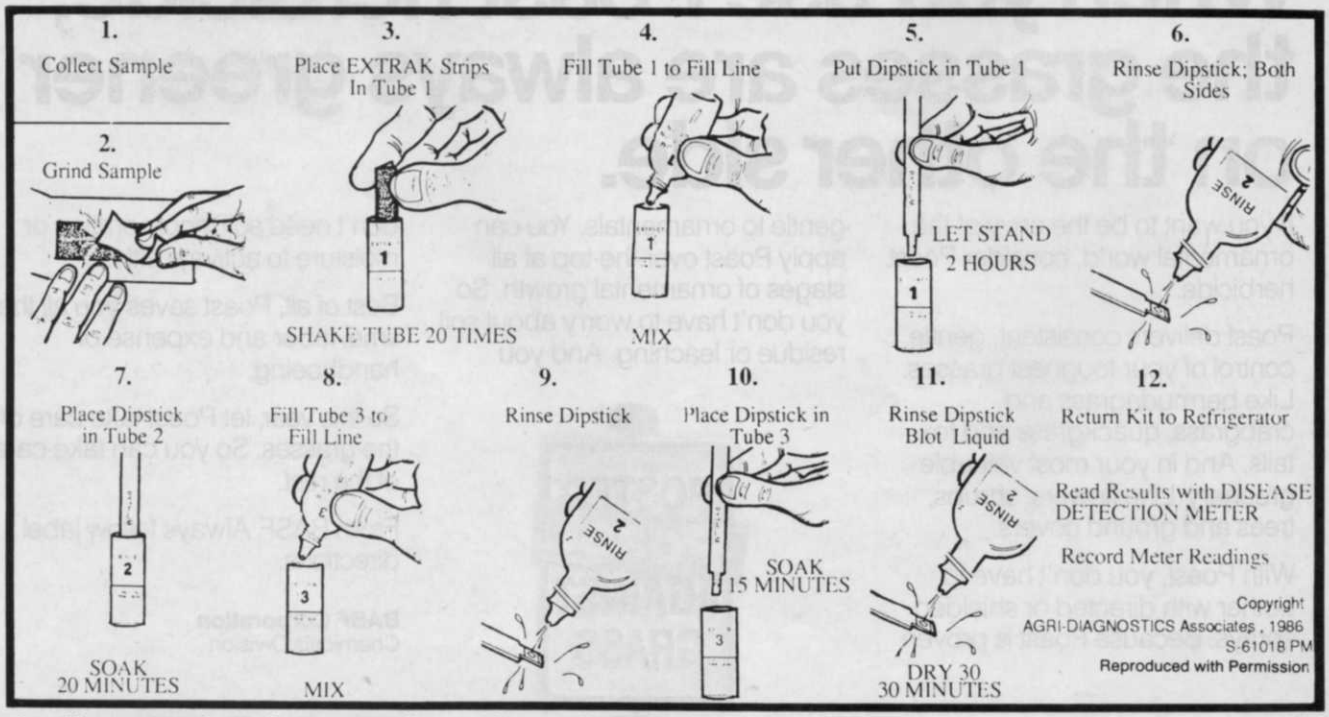
Shane concurs. "It will be curious to see if the kit can be used before the fungus reaches symptomatic levels."

Vonnie L. Estes, Agri-Diagnostics' product support specialist, says the kit can be used in such a capacity, adding that the company uses this ability as one of the kit's selling points.

While the kit has been marketed to golf course superintendents thus far, Estes says that kits for ornamentals and lawn care are forthcoming, probably in 1988.

Distribution of the kit has reached only Indiana, the Chicago area and northern New Jersey thus far, but distribution will be widened in 1988. **LM**

If you'd like more information on the disease detection kits, contact Agri-Diagnostics at (609) 829-0110 or write: 2611 Branch Pike, Cinnaminson, N.J. 08077.



This illustration shows how to use the turf disease detection kits.

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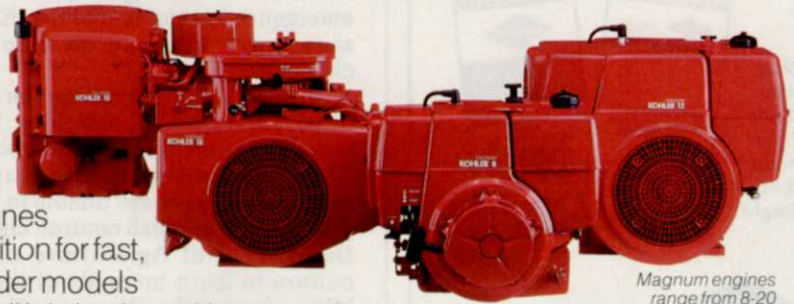

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Both of these easy-to-use granular DURSBAN formulations can be applied with any spreader. Just water-in according to directions and those troublesome pests will be sent on a permanent vacation.

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Circle No. 123 on Reader Inquiry Card

PROBLEM MANAGEMENT

by **Balakrishna Rao,** Ph.D.

Preventing weed growth

Problem: *Can you suggest any method which would control growth before germination in a large bed of wood chips (without damage to large locust trees)? (New York)*

Solution: To manage weed (annual or perennial) growth before germination in wood chip beds, apply pre-emergence herbicides in the fall or early winter and again in the spring or summer as needed. For annual weeds, apply Princep in fall at 3 lbs. active ingredient (AI) per acre. This treatment will provide weed control until late spring or early summer at which time another pre-emergence herbicide application should be provided.

Other pre-emergence herbicides, such as Ronstar, Dacthal, Devrinol, Dual, Enid, Lasso or Surflan, can be used alone or in combination with 1 lb. of Princep in summer. These combination treatments will increase the residual activity period as well as provide control of a wider spectrum of weeds. If the Princep was used at 3 lbs. AI per acre rate in fall or winter, do not use 2-3 lbs. AI per acre of that material again in spring or summer. However, if Princep was not used in fall or winter, then it can be used at the 3 lbs. AI per acre rate in spring or summer.

Rangeland herbicides

Problem: *Is there a herbicide for rangeland that would control big and little sage brush (greasewood)? (Canada)*

Solution: In reviewing the literature, no specific recommendations for sage brush control were found. Sage brush along with mugwort (chrysanthimum weed) and wormwood belong to the same genus Artimisia (Compositae). Most of these are aromatic herbaceous plants growing in dry areas in the northern hemisphere. Since both mugwort and wormwood can be managed by the application of a preemergence herbicide like Dacthal, it is probable that sage brush also can be managed by the same chemical.

In addition, mugwort can be managed by the use of post-emergence herbicides, like Casoron or Eptam. These need to be incorporated into the soil. These post-emergents also may be active on sage brush. Since we were unable to find any recommendation for sage brush control, check with the Canada Department of Agriculture or Ministry of Agriculture to learn more about the activity and feasibility of using the above-mentioned products. Read and follow label specifications for best results. **LM**

Balakrishna Rao is Director of Lawn Care Technical Resources for The Davey Tree Co., Kent, Ohio.

Questions should be mailed to Problem Management, Landscape Management, 7500 Old Oak Boulevard, Cleveland, OH 44130. Please allow 2-3 months for an answer to appear in the magazine.

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In recent years more university studies (such as Michigan State, Ohio State, Penn State, Texas A&M, VPI, University of Illinois, etc.) have shown that balanced rates of N&K are ideal for summer feeding program on all fine turf.

WHY:

(1) - the reason is simple — N without K gives soft, lush growth — N with balanced K gives strong, hard growth.

(2) - spoon feeding — small amounts of a balanced diet of N&K is agronomically better for the plant.

(3) - Fluf® - being a slow release source of N has proven superior, as a non-burning source of N during the summer months.

(4) - Fluf® 10-0-10 is easily mixed with fungicide sprays compatible with most pesticides, adjuvants and micro-nutrients.

RATES:

(1) - Fluf® 10-0-10 - use at 8-10 fluid oz./1,000 square feet for greens, tees, aprons and 12 fluid oz./1,000 square feet for fairways.

(2) - spoon feed the above rates on a 7-10 days basis: 8 oz., Fluf® 10-0-10 will give 1/16 #N and 1/16 #K per treatment.

(3) - combine Fluf® 10-0-10 with TruGreen™ (at 2-4 oz./1,000 square feet) for minor element sources of iron, magnesium, zinc, copper, etc.

(4) - 8 oz. of Fluf® 10-0-10 per 1,000 square feet will cost less than $.50/1,000 square feet - or approximately $20/acre.

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Rain Bird's Maxi III Computer Control System offers a simple programming format with a built-in instruction manual. Each station has independent controls for independent programming.

A back-up satellite system allows for the field program to take control of the system if the main computer goes down or the wiring is severed. Water budgets can also be programmed. The system also has the capacity to adjust to managerial practices and conditions such as fertilizing or seeding.

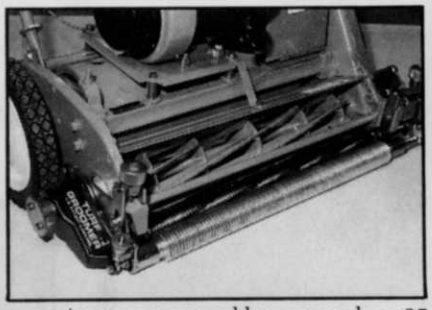
Circle No. 190 on Reader Inquiry Card

Greens conditioner attaches to mowers

Jacobsen's exclusive Turf Groomer greens conditioner will be available for use on the company's line of walk-behind greens mowers. It can now be attached to the Greens King IV plus 19- and 22-inch greens mowers.

The Turf Groomer lifts up and cuts horizontally-growing grasses and surface runners, which are then clipped by the mower reel.

The strong vertical grass resulting from regular use of the groomer provides a smooth putting surface, increasing green speed by as much as 25 percent without lowering cutting height or disrupting play.



Circle No. 191 on Reader Inquiry Card

Weed control fabric is made of polyester

New Weed Arrest from Warren's Turf Nursery is 100 percent polyester for resistance to sun damage and decomposition, according to Emory Hunter of Warren's.

The product is made by Hoechst Fibers to be highly water-permeable, and it has a good coefficient of friction so it will not slip as much as some other materials, Hunter notes.

Because of its composition, Weed Arrest is highly pliable and its high elongation (stretch) allows it to conform to every contour of the landscape.

In a study done at Clemson University, Weed Arrest provided excellent control of johnsongrass, yellow nutsedge and large crabgrass.

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PROJECT MANAGER: Excellent opportunity for career and goal oriented individual to work with a commercial landscape firm in Atlanta, Georgia. Must be experienced in all aspects of landscape construction and willing to assume total responsibility. Good salary, benefits and incentive program. Scapes, Inc. 404-956-7500. 6/87

Fleet Superintendent/Equipment Coordinator to perform maintenance on diesel/gas equipment 80 h.p. to 1 h.p. and coordinate the use of equipment for a grounds maintenance service company throughout the state of Florida. Please send resume to Quandt-Ayer Enterprises, P.O. Box 271880, Tampa, FL 33688. 6/87

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Positions are available in various Florida metropolitan areas.

Our firm has an established growth pattern and record of profit sharing. Interested and qualified candidates should submit resume and salary history in confidence to:

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EXPERIENCED FOREMAN: Landscape Design & Construction Firm, seeking an **EXPERIENCED** Foreman, 3-5 yrs. Individual must be able to take total responsibility of projects, from start to finish. Plant knowledge, Construction Techniques, and Blue Print reading a must. **SALES:** Landscape Sales person, 1-2 yrs. experience. Individual must be aggressive, and willing to learn. Design ability a must. Contact Jim at Vander Veen Landscape Co., 840 West Columbia St., P.O. Box 164, Mason, MI 48854, (517) 676-1093. 6/87

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THE TRUTH IS: Most management positions are never advertised outside the company. They are filled from within or by word of mouth. We have access to the inside jobs that companies do not advertise in the newspapers or trade magazines. **GREEN INDUSTRY RESOURCES CORPORATION** can locate management positions suited to your needs. Write or call Beecher Smith, 25230 Conrad Ct., Damascus, MD 20872, (301) 253-5787. All inquiries are confidential. 6/87

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Circle No. 135 on Reader Inquiry Card

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October 19, 1987	Grand Rapids, MI	October 19, 1987	Indianapolis, IN
November 9, 1987	Buffalo, NY	October 26, 1987	New York City, NY
November 16, 1987	St. Louis, MO	December 7, 1987	Chicago, IL
November 30, 1987	Charlotte, NC	December 7, 1987	Pittsburgh, PA
December 14, 1987	Cleveland, OH		
January 11, 1988	District of Columbia		

Small Business Training		Electrical Hazards and Safety	
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Mr. George W. Sahr
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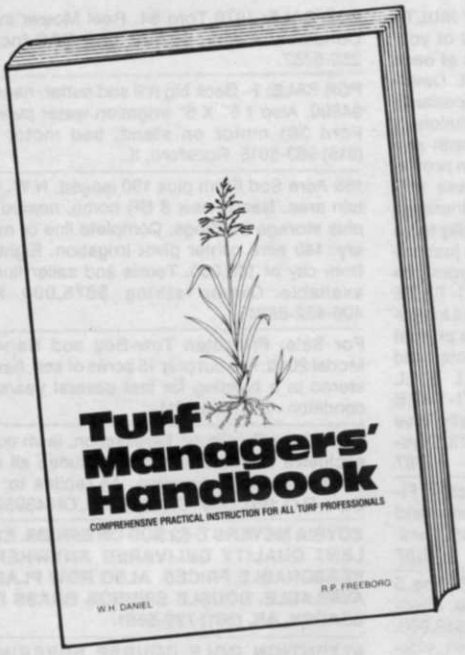

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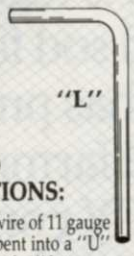

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Circle No. 121 on Reader Inquiry Card

Athletic fields: Art or science?

Art: Human effort to imitate, supplement, alter or counteract the work of nature.

Science: The observation, identification, description, experimental investigation and theoretical explanation of natural phenomena.

Which definition best fits athletic field management? "Right now, it's an art," says Steve Wightman, field manager of Denver's Mile High Stadium. "But it's time to start applying scientific knowledge to it."

Wightman is right. Mowing, aerating, and watering are like carefully implemented brush strokes bringing texture and character to the overall picture. Good field management supplements the work of nature. It is an art.

But in this month's issue we examine the scientific aspect of field management. Many of you have never heard of an oscilloscope or a *G-max* before. But by the turn of the century, they will be words as common as mowing heights when discussing good field management.

Some field managers already are applying the concepts. I recently met with Lakewood, Ohio school officials who are installing a synthetic Balsam surface on two fields at the high school. They had done the research and assured me that artificial was the only way to go. I wasn't convinced. "I plan to have an independent lab test the field annually," explained Jim Stanton, director of operations. "It's written into the contract that the *G-max* can't exceed 95 or they'll replace the field."

That was the first time I heard a field manager refer to a *G-max* value. I'm still not convinced. But if Stanton follows through with that plan, I am somewhat relieved.

The Lakewood fields are synthetic, but the same technology can be applied to natural fields. "Every field manager needs to know about *G* levels," says Jim Watson, Ph.D., vice president of the Toro Co. Watson says that "shear strength" of the turf is an equally important issue in need of an accurate and available measuring system.

Eliot Roberts, Ph.D., of the Lawn Institute points out that the Stimpmeter is used to measure the speed of golf greens, so an instrument to measure playability of an athletic field is not far-fetched.

The argument against such measurements is the weather which changes field conditions. But if a manager knows what the optimal *G-max* level and shear strength of the field is, then weather can be a tool, not a hindrance, in keeping the field in good condition. Managers need to look at both perspectives in caring for a field. By creatively nurturing a field, it is an art. By technically measuring playability, it's a science.

By doing both, it's safer for young athletes.

Heide Aungst

Heide Aungst, managing editor

Questions and comments are encouraged.
Write or call editor Jerry Roche:
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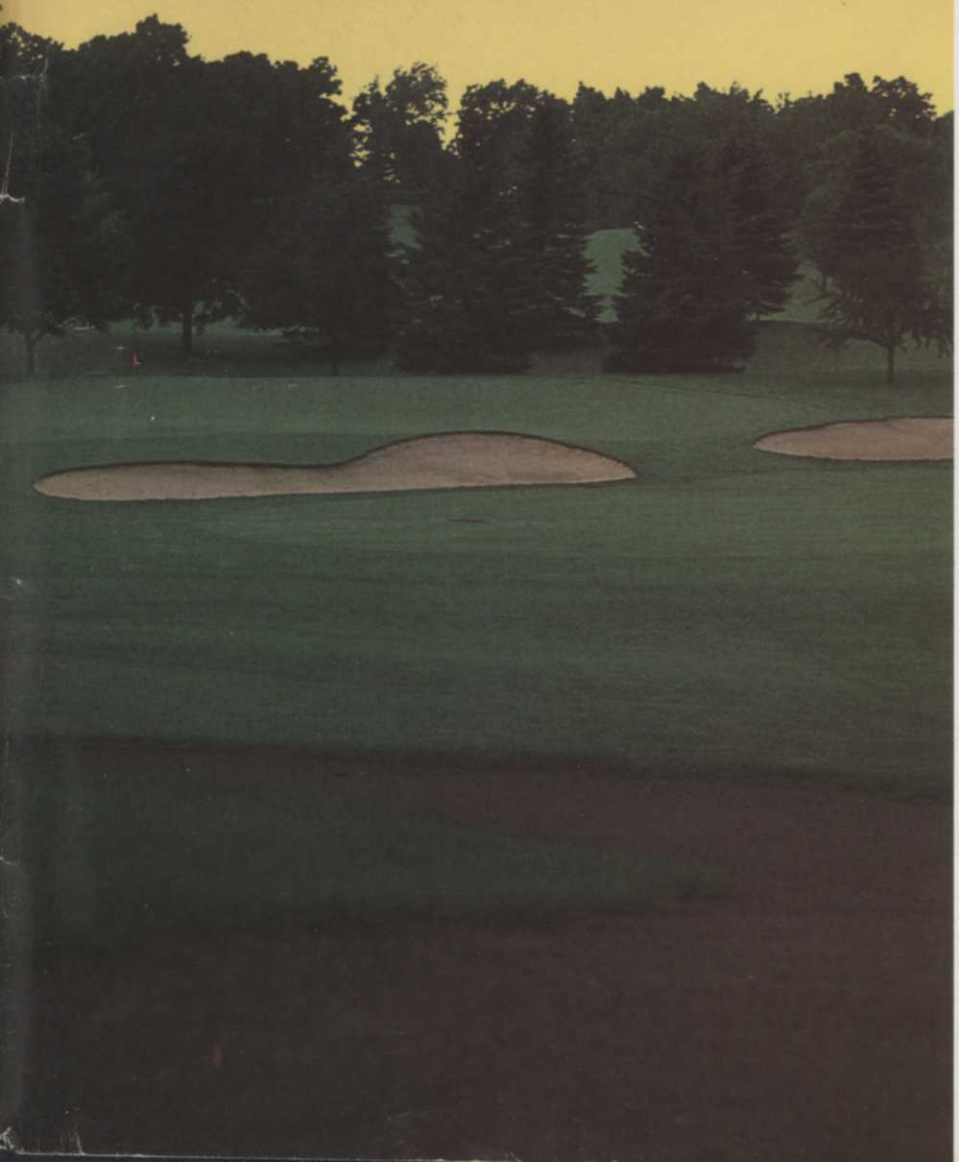

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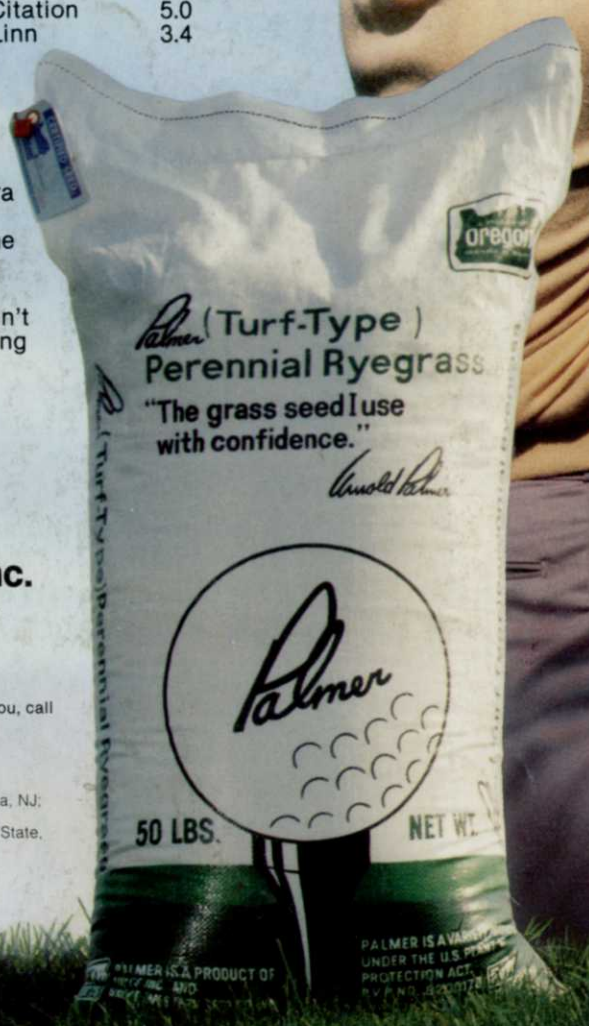

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